

603-CD-003-001

## **EOSDIS Core System Project**

# **ECS Operational Readiness Plan for Release 2.0**

January 1998

Raytheon Systems Company  
Upper Marlboro, Maryland

# ECS Operational Readiness Plan for Release 2.0

**January 1998**

Prepared Under Contract NAS5-60000  
CDRL Item #111

## **RESPONSIBLE ENGINEER**

<u>Rodney Creecy /s/</u>	<u>1/15/98</u>
Rodney Creecy, Systems Engineer	Date
EOSDIS Core System Project	

## **SUBMITTED BY**

<u>Karen Hoffman /s/ for</u>	<u>1/15/98</u>
Thomas J. Hickey, Manager	Date
Maintenance and Operations	
EOSDIS Core System Project	

**Raytheon Systems Company**  
Upper Marlboro, Maryland

603-CD-003-001

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# Preface

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This document is a contract deliverable with an approval code of 1. As such, it requires Government review and approval prior to its acceptance and use. Class 1 documents will be under Contractor Configuration Control Board/Configuration Management Board control. Contractor--approved changes to documents under contractor configuration control are handled in accordance with Class I and Class II change control requirements described in the EOS Configuration Management Plan. Class I changes approved by the contractor CCB are forwarded to the Government for final approval and are not to be implemented until contractual direction is received from the Government. Class II changes approved by the contractor configuration control board are implemented under the board's authority.

This document does not address the Flight Operations System *Operations Readiness Plan* which is now under separate cover as ECS 603-CD-004-001 issued in October 1997.

Any questions should be addressed to:

Data Management Office  
The ECS Project Office  
Raytheon Systems Company  
1616 McCormick Drive  
Upper Marlboro, MD 20774-5372

Technical questions should be addressed to Rodney Creecy (301-925-0314 or e-mail to [rodney@eos.hitc.com](mailto:rodney@eos.hitc.com)) or Karen Hoffman (301-925-0544 or e-mail to [khoffman@eos.hitc.com](mailto:khoffman@eos.hitc.com)) of the Sustaining Engineering Office.

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# Abstract

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This ECS Release 2.0 Operational Readiness Plan (DID 603/OP1) identifies and describes the activities required to prepare for, verify, and review the operational readiness of ECS Release 2.0 for AM-1 operations support. The plan covers the readiness of Maintenance and Operations (M&O) personnel, procedures, hardware, software, and databases. The roles and responsibilities of all organizations participating in this effort are established.

ECS Release 2.0 Operational Readiness verification consists of determining the status and connectivity of system components by system monitoring tools; assessment of staffing levels and certification; visual status checks; and the execution of Operational Readiness Exercises (ORE). The results from the ORE at all levels of the ECS Release 2.0 system are reviewed collectively at the system Operational Readiness Review (ORR) to declare the system ready for operations.

The ECS Release 2.0 Acceptance Test organization verifies that the ECS hardware, software, and databases meet functional and performance requirements. Successful accomplishment of their ECS acceptance test and EGS integration activities are prerequisite to M&O operational readiness activities which begin seven weeks prior to the Release 2.0 ORR. M&O DAAC personnel are trained on the Pre-Release B Testbed and the Release 2.0 delivered system; refine operations and maintenance procedures; and support acceptance testing of the system during the period from Custom Software Turnover (CST) to ORR. ECS personnel support EGS-1 Integration and Test activities and conduct Operational Readiness Exercises (ORE) preparing for the ECS Release 2.0 Operational Readiness Review (ORR). Additionally, M&O personnel support AM-1 interface testing and science software integration and testing (SSI&T) during the period prior to the ECS ORR. The ECS ORR marks the readiness of ECS to support the AM-1 mission readiness activities in preparation for the launch of the AM-1 spacecraft and initial AM-1 operations.

**Keywords:** ECS Operational Readiness, operational, operations, readiness, M&O, Maintenance and Operation

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# Change Information Page

List of Effective Pages			
Page Number		Issue	
Title		Submitted as Final	
iii through xii		Submitted as Final	
1-1 through 1-4		Submitted as Final	
2-1 and 2-2		Submitted as Final	
3-1 through 3-46		Submitted as Final	
4-1 through 4-24		Submitted as Final	
5-1 through 5-18		Submitted as Final	
6-1 and 6-2		Submitted as Final	
A-1 through A-8		Submitted as Final	
B-1 through B-36		Submitted as Final	
C-1 through C-10		Submitted as Final	
AB-1 through AB-4		Submitted as Final	
Document History			
Document Number	Status/Issue	Publication Date	CCR Number
603-DR-001-001	DRAFT	November 1996	97-1751
603-CD-003-001	Submitted as Final	January 1998	



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## **Appendix B. Draft Maintenance and Operations Checklists for ORR**

## **Appendix C. Pre-Release B.0 Testbed Lessons Learned Experience**

## **Abbreviations and Acronyms**

# 1. Introduction

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## 1.1 Identification

This Operational Readiness Plan, CDRL item 111, whose requirements are specified in Data Item Description DID 603/OP1, is a required deliverable under the EOSDIS Core System (ECS) Contract (NAS5-60000). This is the initial submittal of this document.

## 1.2 Scope

This Operational Readiness Plan identifies those activities required to prepare the ECS for operation of the Release 2.0 AM-1 mission, and to assure that all required ECS functions are on-line and in operational-ready status in preparation for an operational system event. It covers the schedule period from Release 2.0 Custom Software Turnover (CST) through the point of declaring ECS ready for initial operations mission events for AM-1. That readiness point is termed the ECS Release 2.0 Operations Readiness Review (ORR) and is a prerequisite to ECS participation in AM-1 Mission Readiness activities.

Activities within the preparation and operational readiness periods are performed by several organizations as introduced in Table 1-1, ECS Release 2.0 Organizational Participation by OR Activity, and defined in more detail later in the plan. Flight elements are discussed in the Flight Operations System (FOS) Operational Readiness Plan under separate cover.

**Table 1-1. ECS RELEASE 2.0 Organizational Participation by OR Activity**

<b>FUNCTION/ ORGANIZATION</b>	<b>Preparation for M&amp;O</b>	<b>ECS Rel 2.0 ORE and ORR</b>
ECS Science Office	X	
GSFC DAAC	X	X
• EOC	X	X
• GSFC SCFs (ASTER & MODIS)	X	
• FDF	X	
• NOAA	X	
• DAO	X	
EDC DAAC	X	X
• EDC SCFs (ASTER--U.S. & Japan & MODIS)	X	
• Landsat Processing System		
LaRC DAAC	X	X
• LaRC SCFs (MISR, CERES, MOPITT, & SAGEIII)	X	
NSIDC DAAC	X	X
MODIS SCF		
SMC	X	X
EBnet		X
NSI		X
EDOS		X
Note: (•) items are governed by Operations Agreements		

This plan identifies and describes the activities required to prepare, verify, and review the operational readiness of all ECS Release 2.0 Maintenance and Operations staff, procedures, hardware, software, and databases for AM-1 operations support. The relationship, roles, and responsibilities of all organizations participating in parts of this necessarily cooperative effort are explicitly established.

### **1.3 Status and Schedule**

This is the second release of this document. It is produced to support the ECS Release 2.0 deployment . Another version of this document will be produced for each major development release of the ECS.

### **1.4 Document Organization**

Section 1 describes the structure and scope of the document, identifies the topics covered, purpose and objectives, and the document organization.

Section 2 identifies the documentation from which this plan takes its authority, and to which the reader can refer for further information on the subject.

Section 3 identifies, describes, schedules, and assigns responsibility for activities at the ECS System level; on-site tailoring of mission-specific procedures/ tasks; and their associated roll-up for system-level review that must be accomplished before the ECS Release 2.0 / AM-1 Operational Readiness Review (ORR) can be successfully concluded. Those activities include high-level prerequisites to ORR, the exercises required to verify operational readiness, and the ORR itself. The ECS Operational Readiness Exercises (ORE) for each level of the system are identified and described and the purpose, scope, authority, criteria, and schedule for the ORR are detailed.

Section 4 identifies, describes, schedules, and assigns responsibility for the activities that must be accomplished at a DAAC before the ECS/ AM-1 Operational Readiness Review (ORR) can be successfully concluded. Those activities include site-specific (and site-unique) prerequisites to ORR, the exercises required to verify operational readiness, and readiness for the ECS ORR itself.

Section 5 describes schedules and assigns responsibility for the activities that must be accomplished at the ECS SMC before the ECS/ AM-1 Operational Readiness Review (ORR) can be successfully concluded. Those activities include site-specific (and site-unique) prerequisites to ORR, the exercises required to verify operational readiness, and readiness for the ECS ORR itself.

Section 6 describes the use of operational readiness exercises in routine operation to determine continuing readiness for operations.

Appendices A, B, and C present material to expand upon the content of the body of the plan. The appendices includes the specific information addressing turnover activities/ responsibilities; draft M&O checklists for ORR; and Testbed Lessons Learned.

Abbreviations and Acronyms contains the definitions for the abbreviations and acronyms used in this document.



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## 2. Related Documentation

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### 2.1 Parent Documentation

The parent document is the document from which the scope and content of this ECS Release 2.0 Operational Readiness Plan is derived.

423-41-01	Goddard Space Flight Center, EOSDIS Core System (ECS) Statement of Work
107-CD-002	Level 1 Master Schedule

### 2.2 Applicable Documentation

The following documents are referenced within this ECS Release 2.0 Operational Readiness Plan, or are directly applicable, or contain policies or other directive matters that are binding upon the content of this volume:

302-CD-002	SDPS & CSMS Release B and FOS Release A and B Facility Plans, 9/95
319-CD-006	Release B System and Segment I&T Plan
322-DR-001	Release B I&T Procedures, Volume 1: CSMS
322-DR-002	Release B I&T Procedures, Volume 2: SDPS
420-05-03	Goddard Space Flight Center, Earth Observing System (EOS) Performance Assurance Requirements for the EOSDIS Core System (ECS) through CH-01, 6/2/94
423-41-02	Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS), 6/2/94
601-CD-001	Maintenance and Operations Management Plan for the ECS Project
603-CD-004	ECS Flight Operations System Operations Readiness Plan Release B, October 1997
604-CD-001	ECS Operations Concept for the ECS Project: Part 1-- ECS Overview
604-CD-003	ECS Operations Concept for the ECS Project: Part 2A -- ECS Release A
605-CD-001	Operations Scenarios for the ECS Project: Release-A
607-CD-001	Maintenance and Operations Manual for the ECS Project
608-CD-001	ECS Operations Plan

609-CD-003	Version 2.0 Operations Tools Manual
611-CD-004	Version 2.0 Mission Operations Procedures
205-CD-002	Science Users Guide and Operations Procedures Handbook, Part 4 (The Green Book)
622-CD-001	ECS Training Plan
625-CD-001	Training Material, Volume 1: Course Outline
627-CD-002	Security Risk Management Plan for Release B
NAS5-32605-1109	EOS Ground System (EGS) Integration And Test Program Plan, Baseline (Deliverable 1109), August 15, 1996

## 2.3 Information Documentation

The following documents, although not referenced herein and/or not directly applicable, do amplify or clarify the information presented in this document. These documents are not binding on the content of the ECS Release 2.0 Operational Readiness Plan.

305-CD-100	Design Specification Overview
500-1002	Goddard Space Flight Center, Network and Mission Operations Support (NMOS) Certification Program, 1/90
409-CD-002	Release B Overall System Acceptance Test Plan
GSFC document	DAAC Rehearsal Plans
GSFC document	Draft <i>EGS Science System and Operations Certification Plan Development Process</i> document, 11 November 1997 version

### 3. ECS Release 2.0 Operational Readiness

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ECS Release 2.0 Operational Readiness verification consists of determining the status and connectivity of system components through the use of system monitoring tools, visual status checks, and the execution of Operational Readiness Exercises (ORE). The results from the ORE at all sites of the ECS Release 2.0 system are reviewed collectively at the system Operational Readiness Review (ORR) to declare the system ready for operations. The objective is to structure all mission preparation activities (development/integration/testing/operations rehearsals) to meet operations readiness needs of DAACs and Instrument Teams (ITs).

ECS deployment has been replanned to occur in a sequence of drops with each including incremental increases in capabilities to achieve Release 2.0 as explained in the section 3.1.3. With the former program, Development/ Integration focused on demonstrating subsystem functions; System/ Acceptance Testing focused on verifying requirements; EGS focused on end-to-end performance and interfaces; and DAAC readiness activities focused on operational scenarios. This prior approach required several hand-offs and associated learning curves. Operations was stated to commence following the Release Readiness Review with the operations exercises leading up to the ORR.

The new approach maximizes the focus of multiple groups on Operational Launch Readiness by efficiently transitioning from Development to Launch-Ready DAACs:

- Use Launch-Critical scenarios defined by the DAACs/ ITs to organize and prioritize System/ Acceptance Test Program
- Prioritize Development activities accordingly
- Focus Integration activities on building-up capabilities to support Launch-Critical scenarios
- Integration phase scenarios provide a basis for Acceptance Test Procedures to focus on Launch critical requirements, which in turn provide a foundation for Operations Procedures
- DAAC personnel are included in all phases of testing
- Provide a "mode" at each DAAC for operations exercises/ operations procedures development to occur in parallel with System Acceptance Testing

Readiness verification via relatively non-complex means is made possible because of the extensive installation, checkout, test and integration that will have taken place prior to the point of determining readiness for system operations. ECS Release 2.0 Integration and Test (I&T), Acceptance Test (AT), DAAC operational exercises, and EOS Ground System (EGS) I&T verify that system components (hardware, software, and interfaces) meet functional, performance, and mission operational requirements. Successful accomplishment of their integration, test, and verification activities is prerequisite to M&O operational readiness certification activities.

ECS M&O DAAC/ SMC people support the activities of all integration and test and acceptance test operations in their facilities. This support experience provides a vital ECS familiarization and training function for ECS M&O personnel as well as an accommodation to the test teams.

This Operational Readiness Plan identifies the ECS system components which are verified to be installed, integrated and tested, at the Release 2.0 deployment, and which must be staffed, data populated, and ready to begin preparation for AM-1, L-7, and Meteor missions support and general ECS operation after ORR. The period between these milestones is one of intense preparation for maintenance and operation of the system at the conclusion of acceptance testing. Major ECS system activities that originate at operating locations include:

- Science Software Integration and Test,
- Interface Testing.

Some ECS support and operations functions are deemed critical to data operations and are therefore designated to be certified as ready for operations prior to use. Those certifications must be completed prior to the start of data operations. System security, selected personnel proficiency, and selected operational procedures have been designated critical in the ECS Certification Plan, (DID 626) which also defines certification requirements. The completion of required certifications will be part of the ORR success criteria.

### **3.1 Preparation for ECS Release 2.0 Operational Readiness**

This section identifies the major ECS Release 2.0 activities and events which must be successfully completed prior to M&O operational readiness exercises to determine complete readiness to perform system operations. Their completion will be tracked and acknowledged by OR personnel using a coordinated checklist discussed in section 3.1.6.

This section (3.0) provides an overview of the Release 2.0 activities across all involved system components and locations. The following sections (4.0 & 5.0) then provide a more detailed view of how each Release 2.0 facility is affected by each Release 2.0 activity, and what OR provisions are made for DAACs and SMC. Section 6.0 discusses ongoing monitoring and verification efforts.

#### **3.1.1 Facilities and Infrastructure Preparation**

##### **3.1.1.1 Identification**

Release 2.0 facilities include the GSFC DAAC, LaRC DAAC, EDC DAAC, NSIDC DAAC, SMC, and EOC. All are the operational elements for Release 2.0.

The ECS Master Schedule identifies specific times and precedence of installation and check-out activities, and the ECS Facilities Plan (DID 302) identifies facility requirements.

ECS Release 2.0 will require communications among the facilities via EBnet.

### **3.1.1.2 Specification**

ECS facilities requirement specifications are provided in CDRL 43, DID 302.

### **3.1.1.3 Status at Custom Software Turnover**

ECS facilities plans require that all ECS facility provisions be ready for occupancy and use well in advance of Custom Software Turnover (CST). COTS hardware and software has been installed and tested and the facilities will have been certified ready for installation of ECS custom software following CST and prior to each incremental delivery as discussed in the Section 3.1.3.

### **3.1.1.4 ECS M&O Responsibilities/Schedule**

ECS M&O supported site Physical Configuration Audits (PCAs) in advance of the ECS Release 2.0 to assure readiness for ECS Release 2.0 installation.

## **3.1.2 Pre-Release B.0 Testbed Experience**

The primary goal for the Testbed was to support early AM-1 and SAGE III Science Software Integration and Test. The Testbed contained a subset of the functionality originally planned for Release A (resources were shifted to expedite Release B.0 and development), plus some limited additional capabilities that were planned for Release B.0. Some operational workarounds were implemented that together with the testbed capabilities satisfied the needs for Science Software Integration and Test (SSI&T) of the Version 1 science software activities.

The Testbed was hosted at four DAAC sites; GSFC, LaRC, EDC, and NSIDC. Early external interface testing was not to be performed using the Testbed at the DAACs. Since the Release B COTS baseline was different than the Testbed (with Release A baseline) DAAC; tests performed in the four DAAC Testbeds would still require extensive regression testing in Release B. For this reason, early external interface testing was supported in the mini-DAAC at Landover with Release B hardware and software.

Formal verification tests of requirements was not performed since the Testbed was not an operational release. Functional and regression testing were conducted on the capabilities of the Testbed using the existing test suites (modified as necessary from the Release A test cases). Testbed processing capabilities was demonstrated using a set of test data generated by ECS Testbed deployment.

There were no formal documentation deliverables. However, we did recognize that the Testbed needed to be maintained until the Release 2.0 hardware is installed. Thus, documentation and training needed to support Testbed operations at the four sites was provided as needed.

The purpose of the Testbed was to support Instrument Teams (IT) and their DAACs in science software integration and test efforts. Functionality included in the Testbed is driven by the support activities that the ITs were expected to need during the life of the Testbed.

SSI&T was supported at the GSFC, LaRC, EDC, and NSIDC DAACs for science software delivered by the ASTER, CERES, MISR, MODIS, and MOPITT Instrument Teams.

Table 3-1 lists the SSIT activities by instrument and site.

***Table 3-1. Instrument Specific Support***

<b>Instrument</b>	<b>DAAC</b>
ASTER	EDC
CERES	LaRC
MISR	LaRC
MODIS	NSIDC
MODIS	GSFC
MODIS	EDC
MOPITT	LaRC

Table 3-2 lists Testbed capabilities identified by the ECS Science Data Engineering Office for SSI&T support. The intent was to support as many of the capabilities as possible with software and procedural workarounds. For this reason the demonstrations included capabilities 1 thru 4 and 8 which would have been available had Release A gone operational. The other capabilities will be tested but will not be part of the pre-deployment demonstration.

**Table 3-2. Testbed Processing Capability\***

Reference Number	Processing Capability
1	Acquire single data granules (HDF-EOS and non-HDF-EOS) each having a unique ESDT but the same temporal locality, where the temporal locality is commensurate with the processing period
2	Acquire multiple data granules (HDF-EOS and non-HDF-EOS) all having the same ESDT and different temporal localities that span or overlap the temporal locality of the output product
3	Produce and Insert single data granules (HDF-EOS and non-HDF-EOS) having same ESDT and temporal locality
4	Acquire data granules (HDF-EOS and non-HDF-EOS) based on temporal locality
5	Acquire multiple static granules having the same ESDT
6	Acquire multiple data granules (HDF-EOS and non-HDF-EOS) having the same ESDT and different temporal localities where at least one is outside the processing period by a known amount
7	Produce and Insert multiple output products each having a unique ESDT and using a unique Metadata Configuration File (MCF)
8	Produce & Insert multiple output products (HDF-EOS and non-HDF-EOS) having the same ESDT and different temporal localities

\*“Acquire” is defined as getting a data granule from the SSIT data store and making it available for input to the science processing software.

“Produce” is defined as executing the science software in order to create one or more data granules.

“Insert” is defined as placing a data granule into the SSIT data store such that it is available for subsequent acquire operations.

Appendix C lists the lessons learned from the Testbed experience that should be applied to the Release 2.0 implementation.

Support for the Version 1 science algorithm integration on the Pre-Release B Testbed involved a significant, successful team effort that included ECS, ESDIS, DAACs (EDAAC, GDAAC, LDAAC, NDAAC), and the EOS AM-1 instrument teams (ASTER, CERES, MISR, MODIS, and MOPITT).

**GDAAC:** Particularly noteworthy was the successful SSI&T of all MODIS PGEs delivered to GDAAC by the MODIS Instrument Team. In addition to the integration of these 16 MODIS V1 PGEs into PDPS, a 10-member chain (PGEs 1 through 10) was also successfully executed that processed simulated EDOS L0 data from Level 1 through progressively higher level processing. Initially, MODIS SSI&T at GDAAC was slow and the GDAAC SSI&T developed metrics for tracking SSI&T steps for each delivered MODIS PGE. This was done in part to anticipate the time necessary to complete Version 2 SSI&T but also to look for bottlenecks in the SSI&T process. Based on the metrics, the GDAAC SSI&T team developed and applied improvements to the SSI&T process which led to dramatic reductions in the times required to integrate the



remaining PGEs. These process improvements are being incorporated into the GDAAC-MODIS Version 2 SSI&T Agreement.

**NDAAC:** In cooperation with the MODIS SDST group, has successfully completed 2 PGEs. PGEs 43 and 45 have successfully completed the inspection and infusion process. Integration has also been completed although a metadata problem was discovered that requires the SDST to fix the PGEs in Version 2. PGE 44, received at NSIDC on 08-Oct-97, has also completed the inspection and infusion processes. Integration is in progress with MCF issues being worked by the SDST. PGE 47 has not been received at the DAAC and is expected to be delivered with Version 2 of the SW.

**EDAAC:** As planned for SSI&T of Version 1 science software at EDC, DAAC local staff combined with members of ECS (Landover) Science Data Engineering to accomplish EDC's Testbed goals. To date 100% of the delivered ASTER Science Algorithms were run through nominal SSI&T by the combined team. Currently, DAAC staff is running these PGEs through additional test cases as provided by the IT. Two remaining non-science ASTER PGEs (QA and Browse) are in work. Chaining with Browse is close to completion; a revised QA PGE is the final ASTER item in the work queue. Seven MODIS PGEs have recently arrived at the DAAC. Landover SDE and EDC have split the job; six are in integration testing with one other in infusion. MODIS is based on older versions of the toolkit/HDF and this has caused special configuration management challenges due to supporting both ITs simultaneously.

**LDAAC:** Langley DAAC successes with algorithm integration include:

- MOPITT: PGE MOP01 successfully completed formal SSI&T. PGE MOP02 required changes within both the PGE and the Testbed to be able to process through PDPS.
- CERES: The two PGEs of CERES subsystem #11, Grid Geostationary, successfully completed formal SSI&T.
- MISR: PGE01 successfully completed formal SSI&T. Both planned test cases were completed for PGE09. Concurrent runs of the two PGE09 test cases together have failed; the reasons for failure are still under investigation. Formal SSI&T was declared complete. PGE08 delivery has been deferred to v2.0 due to development schedule constraints.

**Problem Resolution:** A total of 5 versions of the integrated Toolkit, COTS and custom SW Testbed were documented and deployed. Version 1.0 and 1.1 were the deployed as part of the initial release. Each release was fully documented in Version Description Documents. Three maintenance releases of the Testbed addressed custom software, DAAC toolkit, and COTS product baseline changes. The 56 changes represented by these releases were done in a timely manner that fully supported the challenging SSI&T schedules of the DAACs and Instrument Teams. These changes went through a thorough and rigorous code and unit test, turnover, and independent test process - a process that ensured the deployment of high quality products. SSI&T schedules were accommodated by using engineering patches that were documented using redlines to the sites' VDDs. Configuration control was maintained at all levels by both DAAC and ECS configuration control procedures and boards. The M&O CCB provided a control and review mechanism that provided visibility to DAAC, SEO, development, and system engineering

personnel. A multi-site, cooperative, weekly telecon was used to review and prioritize all Trouble Tickets ensuring that problems were addressed in manner that was responsive to both site and system priorities. The use of the development DDTS tool further enhanced cooperation and coordination between M&O and development.

### **3.1.3 ECS System Turnover Activities**

The general philosophy of the ECS System Turnover Plan (as interpreted from the white paper: 212-WP-002-001 *Game Plan for the ECS Project* ) assumes that success can be achieved by teaming with operational DAACs to deploy a usable ECS. This will allow the ECS team to combine ECS expertise with proven DAAC operational experience. This powerful combination will drive an emerging national asset to a position of operational readiness to support the EOS AM-1 and Landsat 7 launches.

The specific assumptions of ECS Release 2.0 operations are:

1. ECS will be fielded to four sites (GSFC, EDC, LaRC, and NSIDC) although only three, excluding NSIDC, will be operational at launch.
2. The SMC will be established to monitor and report on system activities and facilitate inter-organizational coordination.
3. ECS will perform system verification in the ECS Development Facility (EDF) to ensure a quality product prior to acceptance test at the DAACs. ECS development and test will then fully support DAAC-run interface and end-to-end testing and work with EGS through launch to ensure success of testing and certification.
4. SSI&T for PGEs will be conducted in Landover (locally or by remote access) and/or at the GSFC until completion of regression testing of each site's initial installation.
5. Each hardware suite (test environment or DAAC) will utilize mode management to support the parallel execution of multiple instances of the ECS system (Ops, SSI&T, and Test) rather than requiring independent hardware suites for these multiple instances.
6. Change control from the established project delivery plan will only be made through a combined ECS and ESDIS Management Review Board (MRB) until the completion of acceptance test, and by ESDIS thereafter.

The schedule, which is resource loaded and includes dependency logic, provides for early availability of capabilities through incremental deployment culminating in at launch capabilities that will meet or exceed those originally identified for B.0'. Documentation preparation is included in this schedule with priority given to documentation required to support M&O activities at launch. The schedule for software development and integration is based on estimates that reflect recent (Jan. 97 - Aug. 97) ECS past development experience and accounts for anticipated NCR workoff. A revised change management process that accurately tracks the baseline changes resulting from frequent incremental deliveries will focus on reliably tracking and reporting all NCRs and expediting high priority NCRs.

Integration and testing will focus on DAAC identified launch critical and launch essential operational scenarios. This focus will surface NCRs affecting these scenarios as early as possible and minimize the likelihood of serious problems being discovered late in the test cycle. This will also make software available for Operations rehearsals, EGS testing, and SSI&T activities as early as possible following installation and checkout. Automation of the installation and checkout process is being developed to further reduce the time before an incremental delivery is available.

Training is provided in time for initial site deployments with training updates provided, as needed, in conjunction with subsequent incremental deliveries. Planned site participation in all deployment activities is expected to enhance formal training activities. DAAC-centric launch activities will be coordinated with ECS incremental deliveries, testing, and training through and after launch.

This approach will provide a focus to the ECS team that will allow them to concentrate on operations scenarios that will ensure useful capabilities will be provided at launch.

### **3.1.3.1 ECS Release 2.0 Schedules**

The ECS Turnover Schedule is primarily a roll-up of significant tasks from various lower level schedules maintained by various ECS and Government organizations. This schedule provides information that will make inter-organizational dependencies visible. It is presented with the tasks grouped in two ways. The first presentation is sorted by drop (see definitions below), with tasks not associated with a particular drop (i.e., launches, on going SSI&T activities across drops) appearing at the end. The second presentation is sorted by site, once again with activities not associated with a particular site at the end. The actual schedule is maintained by ECS System Engineering as part of the Program Plan. The presentation here will be limited to a milestone summary to aid in the interpretation of the schedules.

The following definitions explain the terms used in or relevant to the schedule.

#### **Version 2:**

As stated in the ECS Statement of Work, EOSDIS Version 2 encompasses the previously defined ECS Releases B and C. Via the ECS Replan, ECS Releases B and C have been replaced with Releases 2.x. EOSDIS Version 2 begins with support of AM-1, while EOSDIS Version 1 was intended to support TRMM and EOSDIS Version 0, which preceded ECS, provided integrated access to the existing DAACs.

#### **Release:**

A significant system delivery that will be deployed to the DAACs for operational use. Current Version 2 Releases are 2.0, 2.1, 2.2, 2.3, and 2.4.

#### **Drop:**

An incremental package of ECS custom software satisfying the capabilities allocated to that drop and all previous drops. There are six drops (1, 2, 3, 3.5, 4, and 5) identified that will cumulate to

form Release 2.0. The capabilities that will be provided in each of these drops are listed in Appendix A of 212-WP-002-001 *Game Plan for the ECS Project*.

**Turned Over:**

The configuration contains the agreed upon functionality and is ready for turnover to a controlled environment (Mini-DAAC, VATC, or DAAC mode). A clear set of success criteria has been established for the install that is based on the purpose of the configuration. The configuration has been successfully built and all files in the configuration are under ClearCase control by software CM. A successful turnover meeting has been held IAW PI Number CM-1-018.

**Installed:**

The configuration has been successfully turned over. All necessary files to run the configuration have been installed from their controlled ClearCase locations. All servers have been booted and the system is operating normally in a "clean" (without ingested data) state.

**Checked Out:**

The configuration has been successfully installed. Install checkout tests that were agreed upon in the turnover meeting for a given drop have been successfully accomplished.

**Available for Test:**

The configuration has been successfully installed and checked out.

**Mini-DAAC:**

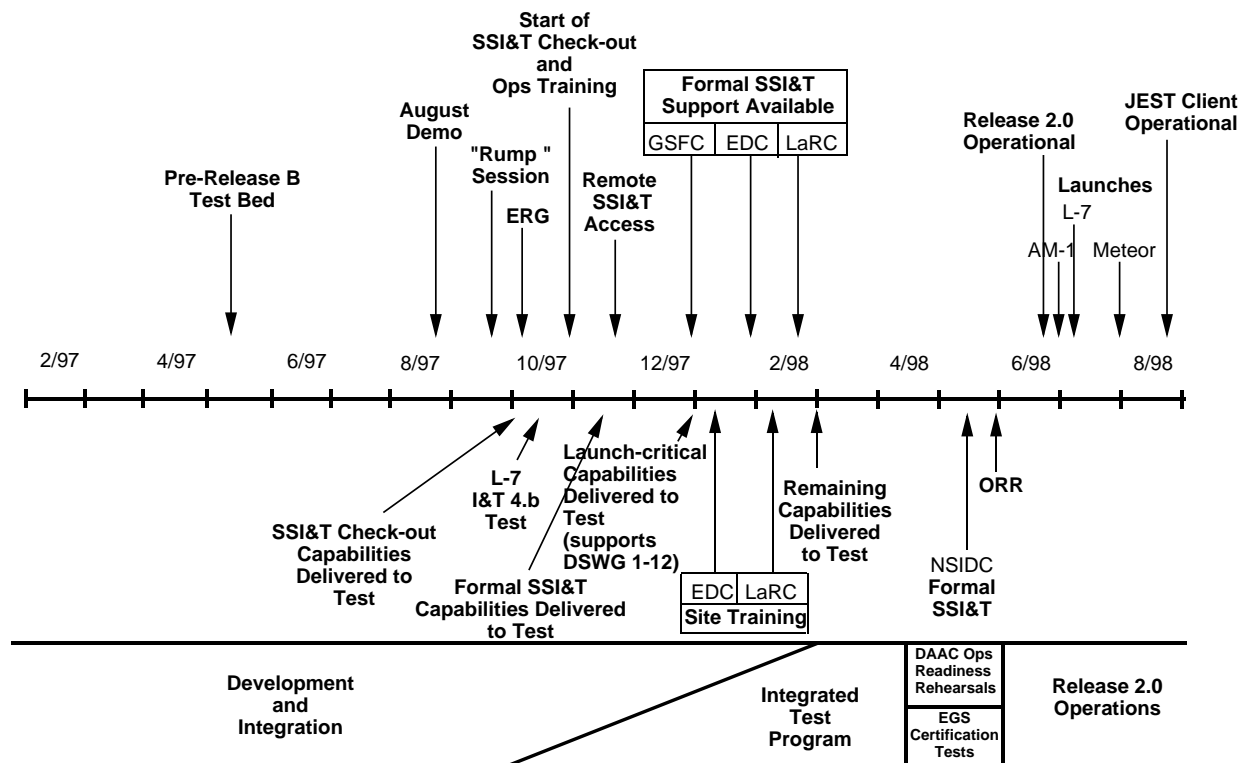
The Mini-DAAC is used as a controlled integration environment and is on the Landover, Maryland EDF network .

**VATC:**

The Verification and Acceptance Test Center (VATC) is used as a controlled test environment. It is on the EBnet and, therefore, available remotely through this network.

**EDF:**

The ECS Development Facility (EDF) is the Landover, Maryland development facility that is used to develop ECS. It is distinguished from the Mini-DAAC and VATC environments by the fact that the latter two environments are controlled and must take all software deliveries from CM prior to installation. The EDF uses developer executables in addition to nightly builds. The development staff uses the EDF to prototype, develop, unit test, and integrate parts or all of ECS.



**Figure 3-1. ECS Release 2.0 M&O OR Activity Milestone Schedule**

### 3.1.3.2 Development

Development has analyzed the remaining work in Version 2 and has divided that work into launch-critical and non-launch-critical components. Development subsystems have built low level, resource-loaded schedules for future work, prioritizing the assignment of staff resources to work that is launch critical. Other factors in prioritization included internal dependencies (needs by other subsystems developing related functionality) and external dependencies (e.g., for SSI&T or external interface tests).

The fundamental basis for the development schedule is the size, in source lines of code (SLOC) for the functionality to be delivered. The number of SLOC for the already delivered software are provided by reference to the software configuration tool, Clearcase. Estimates of code for new functionality are provided by developers in each subsystem. In addition, a common set of assumptions has been used to arrive at the Development schedule: productivity factors for code, unit test, and integration, number of anticipated NCRs per 1000 lines of delivered code, lines of code per NCR, need to support other activities (documentation, training, and installation), and available hours and days to be scheduled (e.g., 8 hours per day, no work on weekends or holidays). Prior to baselining the schedule, the feasibility of the proposed schedule is ensured by reviewing all assumptions and resource loading, across subsystems.

The development integration schedule is determined by the anticipated unit test completion dates for each item to be integrated, and the dependencies across subsystems. Each subsystem is responsible for providing, prior to integration time, interface documentation including scenario descriptions, preconditions, and thread diagrams for each functionality to be integrated. Prior to turnover to test, additional documentation must be provided, including external and internal interaction tables. The integration team, which has dedicated membership from all of the subsystems, uses the interface documentation as the basis of its integration activities, and works to demonstrate the scenarios specified in that documentation. Development integration typically occurs in the development environment, though it may occasionally occur in the Mini-DAAC in order to accommodate a specific hardware configuration need.

The decision to turn over a software drop is based on the available capabilities in that drop, its stability, and the needs of test. In general, drops will be based primarily on schedule, and not on content. That is, although there is a plan for the contents of each drop, a decision may be made to turn it over after negotiating that it contain more or less functionality than originally planned. Any change in the planned functionality allocated to drops must be approved by the Management Review Board (MRB).

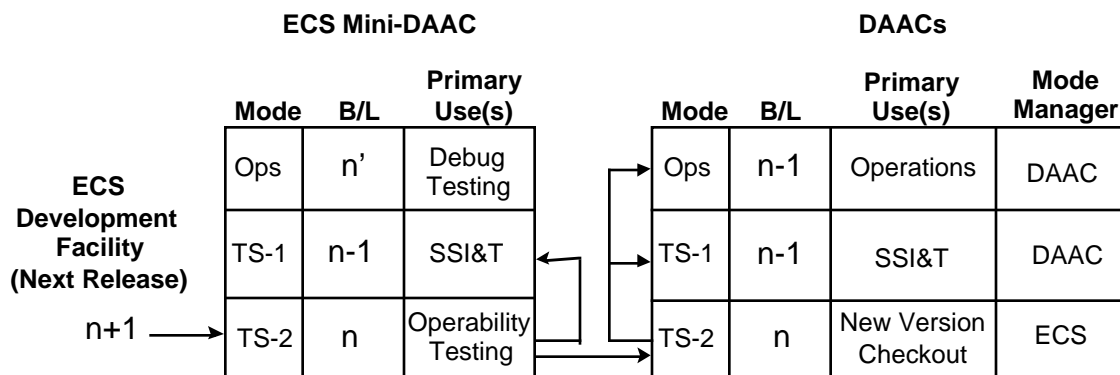
Development has planned and allocated resources to work off NCRs in addition to completing new functionality. Development will proceed primarily on the next drop to be delivered, incorporating non-urgent NCRs in the next drop. In some cases (e.g., for severity 1 NCRs which prevent test from proceeding according to schedule), immediate patches may be required to the current drop being used by test or SSI&T. In this case, the Delivery Manager may decide that Development will immediately work to deliver the needed patch. Note that patches require more overhead for both development and test since they necessitate an extra installation (at least for affected executables) in both places. The Delivery Manager will consider this overhead, the urgency of the patch, and the scheduled delivery of the next drop before authorizing a patch.

### **3.1.3.3 ECS Baseline and Mode Management**

ECS has been designed to operate in multiple modes. This feature allows different versions of the system to exist and operate simultaneously on the same hardware suite at a single site. This is accomplished by replicating the system into different directories (modes) and providing separate databases for these modes. Because Unix is a multi-threaded operating system, these separate copies of the system can run simultaneously and not interfere with one another. In theory, any number of modes can be created. For example, in the ECS Development Facility, 4-6 modes are routinely in operation, each containing a different version of the ECS software under development. In practice, however, baseline management issues, and machine and network resources (CPU availability, disk space, communications paths) will limit the number of modes.

To meet operational requirements, ECS will create three modes in each hardware suite - the Mini-DAAC, VATC, and each DAAC. These three modes are identified as Ops, TS-1, and TS-2. Initially, disk partitions at the DAACs will be split 60% (Ops), 20% (TS-1), and 20% (TS-2) across these three modes. Therefore TS-1 and TS-2 will be about twice the size of the current Mini-DAAC (adequate for SSI&T) and Ops will be large enough to accommodate at launch requirements.

Development baselines will be managed as shown in Figure 3-2:



**Figure 3-2. Developmental Baseline Management**

When a new ECS version “n” has been checked out for operability in the Mini-DAAC controlled integration environment, it is ported to the DAACs (or VATC) and placed into the TS-2 mode for checkout. The most current version of the system will always reach TS-2 first. When the new version (“n”) has been configured, regression tested, and is ready for use, it can then be promoted (copied) into either or both of the two other modes as shown. The timing of this installation is discretionary and takes place under the control of the site’s controlling entity. Experience has shown that this promotion into other modes can be done in a short period of time (currently hours).

This checkout and installation strategy has several distinct advantages:

- The operations mode (Ops) remains stable until an explicit decision is taken to replace the baseline
- Any change to the baseline, including bug fixes, can be fully checked out in the individual DAAC before it is promoted to become the operational system
- SSI&T can be performed in a dedicated mode and isolated from ongoing operations and new deliveries, yet be readily synchronized with new version deliveries when the new versions are ready for installation
- The procedures for new version installation from TS-2 to either Ops or TS-1 can be refined and made routine, since the movement is identical each time (e.g., TS-2 first, careful and detailed preparation for movement, and then rapid movement to either Ops, TS-1, or both)
- New personnel training can be accommodated in modes other than those needed for ongoing operations

The Mini-DAAC Ops mode will not be a true operational mode like the DAACs, but will be used to house debug-enabled versions of ECS. This version has been labeled “**n-prime**” in the graphic above. The reason for the distinction is that this version will have debug/purify code embedded and will be much larger (more than 5 times) than the TS-2 version, even though it will usually be the same baseline as is present in TS-2.

Multiple mode operation imposes a mandatory requirement to actively and aggressively manage baselines to avoid proliferation and continued use of outdated baselines. Because resources are limited, at any one time ECS will support three active baselines:

n-1 (the operational baseline)

n (the baseline being prepared for installation and under regression testing)

n+1 (the future version being developed in the ECS development facility)

The principal impact of the three baseline support limit will fall on formal SSI&T taking place in the dedicated SSI&T TS-1 mode. Formal SSI&T must stay synchronized with the n-1 baseline, upgrading at the same time as the site Ops mode (or very shortly thereafter) to avoid being at the n-2 (or older) level and therefore being unsupported.

During the operational readiness and pre-launch certification periods, the official system undergoing test and certification will always be the version in the Ops mode. Transition from delivery and checkout to DAAC certification and then to full operations is a ramping process that is facilitated by the fact that the system being “officially” tested and certified will be housed in the mode (Ops) where it will eventually operate.

As PGEs become available and are certified in the formal SSI&T TS-1 mode, they can be moved in stepwise fashion from the SSI&T mode to the Ops mode, gracefully increasing scientific processing capability to at- and post-launch required levels.

### **3.1.3.4 ECS Testing**

Testing is conducted on each incremental delivery (drop) of software comprising Release 2.0. There are two controlled test environments in the Landover facility to support this testing; the Mini-DAAC and the VATC. Both environments allow restricted access to software and concurrent testing of multiple versions, or modes, of software. The VATC environment emulates a DAAC environment as much as possible to support early acceptance testing. This environment also allows remote access from other DAAC sites to support external interface testing and SSI&T.

Initial testing of a drop is performed by the Operability Team. This team consists of members from Development, Test, the Science Office, and the M&O organizations. Operability testing is conducted in a dedicated software mode in the Mini-DAAC test environment. The team’s goal is to verify new capabilities and ensure the stability of a delivery before it is turned over to the test team. Automated regression tests that exercise end-to-end system threads are run to validate the software. These tests provide repeatable, measurable results for comparison to previous software versions.



Following operability testing, a delivery is installed in a dedicated mode(s) in the VATC for functional testing. The goal of this test phase is to ensure that the software is sufficiently mature to begin acceptance testing. Functional tests mapped to Level 3 and Level 4 requirements are run to verify a predefined set of system capabilities. These tests are used to detect errors, verify NCR resolutions, and identify requirements as being partially or fully implemented.

Acceptance testing begins in the VATC shortly after functional testing, and continues beyond the functional test phase. The exact start of acceptance testing is determined by the results of functional testing, with the goal being to start as soon as possible. Acceptance tests exercise Launch Critical and Launch Essential scenarios provided by the DAACs. Performance and External Interface tests are also conducted to the extent possible in a test environment. Acceptance testing in the VATC reduces the amount of testing needed at each DAAC, enabling operational readiness activities to begin soon after deployment.

Acceptance testing in the VATC is followed by Site testing. The objective of Site testing is to ensure that the software is configured correctly and can support operational readiness activities. The test procedures are designed to verify site specific functionality and Level 3 requirements. They focus on Launch Critical and Launch Essential scenarios, and include regression tests, site unique requirements, and the verification of site specific NCRs.

Site tests are designed to exercise the system as it would be used in day-to-day operations. System operability, performance, and external interfaces are tested under conditions that simulate operational activities. For example, system performance is verified by a series of 24 hour work load tests. There is one 24 hour test scheduled at GSFC for MODIS (ingest, processing, storage, distribution), and two at EDC for Landsat-7 (ingest, storage and distribution), and ASTER (ingest, storage, processing and distribution). These tests verify that a 24 hour work load can be accomplished within one day without developing a backlog. The tests are performed with live interfaces whenever possible, using Version 2 PGEs and large volumes of simulated data cloned from sample instrument team data. Participation by DAAC personnel during this phase of testing is encouraged to promote training and ensure a smooth transition into operational readiness.

### **3.1.3.5 Science Software Integration & Test (SSI&T)**

The operational procedures to accomplish the various steps that may be involved in the integration and test of Science Data Production Software (SDPS/W) with the ECS are documented in The Green Book. The Green Book is a Technical Data paper formally titled Science Software I&T Operational Procedures for the ECS Project (162-TD-001-002).

Formal SDPS/W integration and test (SSI&T) is performed at the Distributed Active Archive Center (DAAC) responsible for the generation of the standard products. General information concerning preparing and delivering SDPS/W to the DAAC is found in the *Science User's Guide and Operations Procedure Handbook for the ECS Project, Part 4: Software Developer's Guide to Preparation, Delivery, Integration and Test with ECS* (205-CD-002- 003). Each DAAC and Instrument Team (IT) combination have formulated specific agreements, understandings, or procedures that will guide their respective SSI&T activities. The procedures in this document

provide detailed instructions on how to use the tools that are provided in ECS to accomplish the steps outlined in the DAAC-IT procedures.

Prior to the delivery of the ECS software to the DAACs, SSI&T Checkout will be conducted on early versions of the Product Generation Executives (PGEs) using separate system modes in the ECS Mini-DAAC, VATC (Verification and Acceptance Test Configuration), and the Goddard DAAC environments. Within a mode, the ECS subsystems required to conduct early tests of Instrument Team PGEs will be exercised to assure they properly support SSI&T activities.

The Science Department (SD) personnel assigned to support SSI&T will begin the SSI&T Checkout phase by updating the SSI&T Handbook ("Green Book") to reflect the changes between the Pre-Release B Testbed and the full-implementation ECS Release 2.0 system. Upon receipt of the early Version 2 PGEs from the Instrument Teams, the SD SSI&T personnel will begin exercising the revised procedures to ensure their accuracy, and will begin the process of integration and fault isolation normally encountered during Formal SSI&T. The goal of this phase is to ensure correct operation of ECS components, as well as provide early feedback on the compatibility of the PGEs to the B Data model subsystems that were not implemented in the Pre-Release B Testbed.

The SSI&T handbook will be available in a draft form to coincide with the delivery of the SSI&T build (Drop 2). With the delivery of the SSI&T build to the VATC, it is envisioned that DAAC SSI&T personnel will join ECS SD personnel in the informal integration of the DAAC-specific PGEs. Several of the DAACs have expressed an interest in sending some of their personnel to the ECS SSI&T labs to get a head start on learning the ECS software and on the procedures for conducting Formal SSI&T on the ECS Release 2.0 system. The VATC also offers remote connection capability to aid in transition to the Formal SSI&T process at the remote DAACs.

The ESDTs required for SSI&T and ECS system integration have all been prepared and are nearing completion of test by the ESDT test group. As the V2 PGEs are received, the required ESDTs will be extracted from the EDF ClearCase configuration management archive and inserted into the Mini-DAAC or VATC Science Data Server. ESDT personnel will be brought in to support SSI&T personnel if anomalies with ESDTs or Metadata are found. If required, corrections to IT software will be tried, and reported to the Instrument Teams through an informal process. SSI&T personnel will generate NCRs for ECS system anomalies, but will not write trouble tickets against Instrument Team software.

Most of the early SSI&T Checkout activities will be conducted in the Mini-DAAC and VATC environments, permitting SD SSI&T personnel to have easier access to ECS developers for questions and system support. With approximately 18 PGEs planned for early test and integration, there will be system constraints on both the ECS Mini-DAAC and VATC SSI&T systems. To accelerate the throughput of PGEs through the early SSI&T Checkout process, several of the PGEs will be informally integrated and tested on the GSFC system. SSI&T Checkout at the Goddard DAAC will therefore most likely include Instruments other than MODIS. This may require special coordination with remote DAAC personnel on GSFC access and system privileges. The environments at each of these facilities are being sized to handle a

variety of PGEs from the four participating Instrument Teams to permit flexibility of specific PGE integration against available resources.

Once ECS is installed at each remote DAAC, SD SSI&T personnel will aid the M&O organization in the training of DAAC SSI&T personnel in the procedures and operation of the ECS system to support Formal DAAC SSI&T. The Formal SSI&T process will be managed by the DAAC. Following the initial training at each DAAC, SD SSI&T personnel will be assigned to support the Formal DAAC SSI&T process for the duration of the SSI&T process, either on-site or on an on-call basis, whichever is the DAAC preference.

### **3.1.4 EGS Integration and Test**

EGS Integration and Test is integrated via ECS Replan into a new ECS Launch Readiness Approach. The objective is to structure all mission preparation activities (development/ integration/ testing/ operations rehearsals) to meet operations readiness needs of DAACs and Instrument Teams (ITs). With the former test program, Development/ Integration focused on demonstrating subsystem functions; System/ Acceptance Testing focused on verifying requirements; EGS focused on end-to-end performance and interfaces; and DAAC readiness activities focused on operational scenarios. This approach required several hand-offs and associated learning curves.

The new approach maximizes focus of multiple groups on Operational Launch Readiness by efficiently transitioning from development to launch-ready DAACs with the following guiding principles:

- Use Launch-Critical scenarios defined by the DAACs/ ITs to organize and prioritize System/ Acceptance Test Program
- Prioritize development activities accordingly
- Focus Integration activities on building up capabilities to support launch-critical scenarios
- Integration phase scenarios provide basis for Acceptance Test Procedures, which in turn provide a foundation for Operations Procedures
- DAAC personnel are included in all phases of testing
- Provide a "Mode" at each DAAC for operations exercises/ operations procedures development to occur in parallel with System/ Acceptance Testing

According to the Draft *EGS Science System and Operations Certification Plan Development Process* document, 11 November 1997 version, ESDIS has defined a high level plan for the EGS Science System and Operations Certification of "at launch capabilities." The following subsections describe that plan and its major milestones which are prerequisite to the ORR.

### **3.1.4.1 Scope of EGS Testing for ECS Science System and Operations Certification**

As part of Operations Readiness Consolidated Test Concept, ESDIS has decided to conduct the science certification tests which include functional and performance verification using operations scenarios, operations procedures, and operations personnel activities as a single entity. The series of certification tests use the ECS SDP Release 2.0 capabilities/ functions identified by ECS/ ESDIS. The certification tests will use scenarios representative of ECS SDP Release 2.0 capabilities, based primarily on the Release B Operations Scenarios (605-CD-002-001), and Operations Scenarios-ECS release B0 Impacts (220-TP-001-001). The detailed test procedures will use the DAAC operations procedures for execution of the tests.

The certification will test the ECS SDP Release 2.0 capabilities in the context of the Science Data ground system<sup>1</sup>, including formal interface verification of the EGS EDOS, Ebnet, and other EGS components and externals. The certification tests will use the following EGS tests currently under development as a foundation:

EGS5	ECS to Landsat 7 Interoperability Confidence Test
EGS7	EGS Security Confidence Test
EGS9	ASTER Science Operations Confidence Test
EGS10	AM1 Science Data Processing End-To-End Confidence Test
EGS11	EGS Science Data System Performance Test

The goal of the certification tests is to verify and formally demonstrate that the EGS Science System meets key EGS system level functional, interface, and performance requirements such that the system capabilities and operational procedures are adequate at launch for AM1 and Landsat-7 science operations support. The tests will be conducted at the GSFC, LaRC, EDC, and NSIDC<sup>2</sup> DAACs. The test results are direct input to and preparation for the Operations Readiness Review (ORR) milestone.

RMA requirements, archival and processing capacities that are normally verified by analysis are not within the scope of the certification tests. Architectural and design aspects of the system are also not being certified with these tests.

### **3.1.4.2 Consolidated Science System Operations Readiness Test Concept**

The consolidated ESDIS Science System Operations Readiness test plan consists of :

- Developer testing before system deployment

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<sup>1</sup> The EGS Science System and Operations Certification Plan described in this document is executed prior to the overall EGS AM-1 Daily Operations Certification Test which combines Space Craft Operations Certification and Science System Operations Certification.

<sup>2</sup> The NSIDC DAAC certification is expected to occur post-launch.

- Science System Integration & Test (SSI&T)
- Joint DAAC/EGS I&T/ECS system readiness testing, which include functional and qualification tests, before System turn over
- Science System /Operations Certification before ORR/FOR/FRR

The certification tests take into consideration the functional and qualification tests, including formal interface tests, SSI&T plan, and DAAC Tests/operations readiness activities in order to determine the detailed system level functions/operations to be verified during certification.

The certification tests are conducted after successful completion of:

- System verification/ acceptance tests and functional tests, component performance tests.
- Formal SSI&T (Certification Baseline, SSI&T continues post-certification)
- DAAC operational readiness activities (Certification Baseline, DAAC Ops Readiness activities continue post-certification)
- EGS I&T/DAAC qualification tests which contain more detailed scenarios and are prerequisite to the certification tests.

### **3.1.4.3 Pre-Test Activities**

#### **3.1.4.3.1 Management Related Activities:**

Establish a Certification Test Team to conduct the EGS certification tests at each of the DAACs. The team is responsible for:

- Planning
- Implementation
- Monitoring
- Discrepancy Reporting
- Design/identify format for reporting the test results and evaluation

Establish a Review Board at each DAAC.

#### **3.1.4.3.2 Other Activities:**

- Detailed review of the test packages to identify the test data requirements, operational resources required to plan execution of the tests.
- Software and hardware configuration for the tests
- Ancillary data requirements
- Timelines for conduct of tests

- Concurrency of tests
- Sequence of tests
- Duration of tests
- Coordination with other DAACs
- Coordination with external data suppliers
- Contingency operations and workarounds during tests

#### **3.1.4.3.3 Certification Plan Milestones:**

A detailed EGS Science System and Operations Certification planning and preparation schedule needs to be developed after review and revision of this preliminary set of milestones<sup>3</sup>.

$\Delta_1$  --complete certification timeline definition (per DAAC) for launch version EGS system

$\Delta_2$ – list definition of individual EGS system level certifications tests on a DAAC by DAAC basis, cross-referenced to timeline

$\Delta_3$ – list definition of DAAC specific Operations Procedures, cross-referenced to EGS system level timeline for each DAAC

$\Delta_4$ – complete draft of individual EGS system level certification tests on a DAAC by DAAC basis (TBDs defined for capabilities-requirements test scope, work-arounds, test data)

$\Delta_5$ – Definition of individual DAAC EGS System level Qualification Tests (more detailed than Cert tests; defined prerequisites to cert. Tests)

$\Delta_6$ – 60-day maturity level (i.e. 60 days before test) individual EGS system level certifications tests on a DAAC by DAAC basis (detailed procedures – open TBDs are counted as liens against the test packages) These procedures are dry-run and redlined within 30 days.

$\Delta_7$ – 45-day maturity level individual DAAC EGS System level Qualification Tests (detailed procedures – open TBDs are counted as liens against the test packages) These procedures are dry-run and redlined within 45 days.

$\Delta_8$ – 60-day maturity level individual DAAC EGS System level Operations Procedures Qualification Tests (detailed procedures – open TBDs are counted as liens against the ops procedures. These procedures are dry-run and redlined within 30 days.

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<sup>3</sup> The milestone dates are based on the formal ESDIS schedule distributed at the October 23, 1997 DAAC Managers meeting. The maturity milestones reflect a system level Qualification test start date of March 3, 1998, and a Science System and Operations Certification start date of April 15, 1998. Subject to change.

$\Delta_9$  – 30-day maturity level individual EGS system level Certification tests on a DAAC by DAAC basis (detailed procedures – open TBDs are counted as liens against the test packages) These procedures are dry-run and redlined within 30 days.

$\Delta_{10}$  – execute individual DAAC EGS System level Qualification Tests (collect formal results, issue DRs/NCRs). Regression test as required.

$\Delta_{11}$  – execute individual DAAC EGS System level Operations Procedures Qualification Tests (collect formal results, issue DRs/NCRs). Modify procedures as required.

$\Delta_{12}$  – execute individual EGS system level Certification tests on a DAAC by DAAC basis. (collect formal results, issue DRs/NCRs). Regression test as required. Followed by formal certification assessment report to project; results referenced for ORR,

$\Delta_{13}$  – execute individual DAAC EGS System level Operations Procedures Qualification Tests (collect formal results, issue DRs/NCRs). Modify procedures as required. Followed by formal certification assessment report to project; results referenced for ORR.

#### **3.1.4.3.4 Test Results Evaluation**

After completion of the testing of each scenario, actions are taken to record /report the results<sup>4</sup> for evaluation. The process may consist of :

- Test completion report
- Test Discrepancy Reporting (DR)
- DR review
- DR tracking
- DR resolution monitoring
- Re-testing
- Documentation changes
- Assessment of the test results

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<sup>4</sup> Candidate Methods, Procedures and Tools for these activities are available and documented in the EGS I&T Program Plan Rev. 2, May 30, 1997.

### **3.1.5 ECS Release 2.0 M&O Preparation**

#### **3.1.5.1 Configuration Management**

##### **3.1.5.1.1 Purpose**

The objective of Release 2.0 ECS CM activities is to control the baseline configuration of ECS hardware, software, and firmware components deployed to the sites; control changes to these components and associated documentation; and record and report information concerning approved baseline resource changes.

ECS Sustaining Engineering Organization CM activities commence with a hand-off from the Acceptance Test Organization (ATO) following formal Physical Configuration Audit (PCA) and Functional Configuration Audit (FCA) of the ECS delivered product. This software configuration baseline and any associated liens are recorded in the Version Description Document (VDD).

There are multiple levels of configuration management within the ECS Project. DAAC-level CCBs interact with the Science Systems Program Configuration Management Board (PCMB). The PCMB and the ECS Development CCB interacts directly with the ESDIS CCB. The ECS Release 2.0 CCB manages installation and changes at each location prior to turnover under the governance of the ECS Development CCB and, as necessary, the ESDIS and host center CCBs. The ECS M&O organization at each center supports the host organization CCB. In accordance with the ESDIS Configuration Management Plan, GSFC #423-10-21, and the ESDIS Distributed Active Archive Center (DAAC) Strategic/Management Plan, the ESDIS CCB provides configuration control over all ECS developed CIs.

##### **3.1.5.1.2 Specification and Procedures**

ECS Configuration Management requirements are documented in Maintenance and Operations Configuration Management Plan for the ECS Project (102-CD-002-001). The Operational CM Procedures are documented in chapter 9 of the CDRL for DID #611, ECS M&O Procedures.

##### **3.1.5.1.3 Schedule / Status**

Operational CM entails control of ESDIS approved products introduced to the operational environment at or after the Release 2.0 turnover. Prior to turnover, CM of ECS products is administered by the ECS development organization.

##### **3.1.5.1.4 ECS M&O Responsibilities**

ECS M&O at each site will begin preparation to accept configuration management responsibility in advance of the ECS Release 2.0 turnover. They will review and approve baseline transfer plans in conjunction with the ECS Release 2.0 CCB and they will engage in coordination sessions to define and implement actual transfer procedures. Plans to maintain an integrated ECS baseline that allows for controlled differences for site unique processes will be established.



The allocated responsibilities of the ECS CCBs are as follows:

**ESDIS**—Approves system product and establishment of operations baselines, interfaces to external systems, and DAAC unique extensions to ECS products and implements approved changes

**Science Systems PCMB**--Maintains all functional and performance requirements and SMC and DAAC interelement interfaces.

**Mission Systems PCMB**--Maintains all functional and performance requirements and FOS, EDOS, ETS, EPGS, and NISN interelement interfaces.

**SMC**—Monitors system operational configurations; controls SMC operations baseline; assesses and recommends changes to the ECS baseline

**EOC**—Assesses, recommends, and implements ESDIS approved changes to the EOC operations baseline

**DAACs**—Control non-ECS items, site-unique items, and site-specific modifications to ESDIS approved ECS products. Approve changes to the local facility. Implement site-specific modifications of ECS custom software when approved by ESDIS.

**SCFs (autonomous operations)**—Develop enhancements to and maintain science software that is a part of the DAAC ECS operations baseline .

#### Configuration Management at Operational Sites

ECS products deployed to the operational sites are software which is common to various operational sites. Common software that has been released for operational use is maintained in the M&O Software Library and maintained at each site (On-Site SDL). Site personnel maintain independent libraries for science software and other software not developed by ECS. Site personnel are responsible for any CM activities concerned with this library.

Each site maintains control over its site operational environment and products developed and/or delivered outside of the ECS project. Science software—which facilitates the ECS production of Standard Products—is developed by science investigators at the SCFs. Science software developers are responsible for CM of their science software and for transferring all components of the software delivery package to the DAAC. Once the science software is delivered to the DAAC, it and its supporting documentation and data are placed under the custody of the local DAAC CM organization supported as needed by ECS local personnel. The Integration and Testing (I&T) of the science software at the DAAC is conducted by the DAAC management in coordination with the local ECS Project Science Software I&T team. Changes to science software during I&T are coordinated with the science software developer and, if necessary, other DAACs by the I&T team. Changes approved by the science software developer are incorporated in a CM-controlled environment. After acceptance, the revised science software package and all test data are transferred to the control of the local DAAC Manager. The process ensures that each DAAC controls their science software and that science software developers have full visibility into the process and results. Changes to science software having inter-DAAC dependencies will require coordination with the affected DAACs. The local DAAC CM organizations will ensure

that coordination and agreement among the Science Systems PCMB and affected DAACs is completed before changed science software is moved into production.

### **3.1.5.2 Database Preparation**

#### **3.1.5.2.1 Purpose**

ECS Release 2.0 will include installations at the GSFC DAAC, LaRC DAAC, EDC DAAC, NSIDC DAAC, SMC, and EOC (addressed by a separate document). The functions supported at each Release 2.0 location vary, and therefore some of the databases required at each site will vary accordingly. Generally, required databases are broadly categorized as:

- Science Data
- System Management / Configuration Data
- System Access / Security Data

The specific databases within these broad categories are identified in subsequent site-specific documentation posted at the following URLs:

[http://pete.hitc.com/baseline/edc/edc\\_tech.html](http://pete.hitc.com/baseline/edc/edc_tech.html)

[http://pete.hitc.com/baseline/gsfc/gsfc\\_tech.html](http://pete.hitc.com/baseline/gsfc/gsfc_tech.html)

[http://pete.hitc.com/baseline/larc/larc\\_tech.html](http://pete.hitc.com/baseline/larc/larc_tech.html)

[http://pete.hitc.com/baseline/nsidc/nsidc\\_tech.html](http://pete.hitc.com/baseline/nsidc/nsidc_tech.html)

[http://pete.hitc.com/baseline/smc/smc\\_tech.html](http://pete.hitc.com/baseline/smc/smc_tech.html)

In general operation of ECS requires the presence, configuration, and population of the databases listed in Table 3-3, ECS Databases.

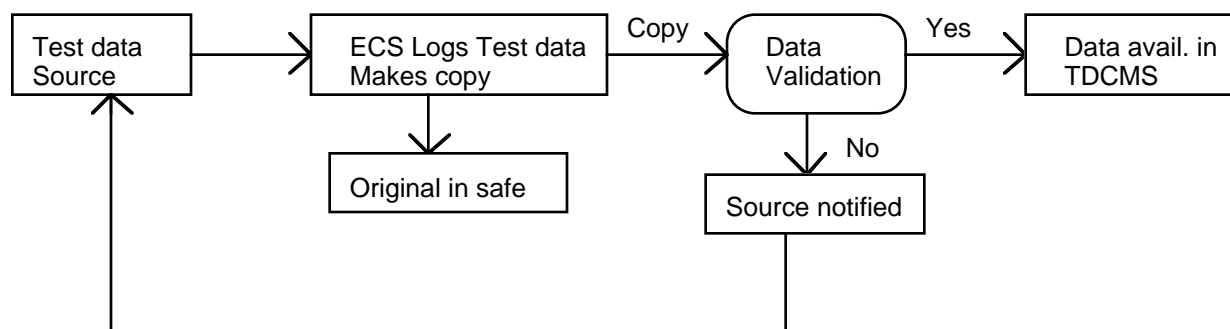
**Table 3-3. ECS Databases**

Database Function	Database Name
<b>MSS Primary</b>	MSS_DB_A
<b>CSS Primary</b>	EcsAc1Storage
<b>Remedy Primary</b>	remedy
<b>Accugraph Primary</b>	accugraph
<b>MSS Standby</b>	MSS_DB_A
<b>CSS Standby</b>	EcsAc1Storage
<b>Remedy Standby</b>	remedy
<b>Accugraph Standby</b>	accugraph
<b>Ingest</b>	ingestops
<b>Ingest Training</b>	ingesttr1
<b>User Pull</b>	DsStPullDisk
<b>Reservations/ Storage Management</b>	DsStScheduler
<b>Data Server</b>	DsMdMetadata
<b>Subscriptions</b>	DsSbStore
<b>V0 Migration</b>	dmpv0ops
<b>V0 Inspection</b>	dmpinsv0
<b>Ingest Early</b>	ingestts2
<b>Ingest Mode Testing</b>	ingestts1
<b>PDPS</b>	PDPS_DB_OPS
<b>Autosys</b>	autosys
<b>DMG</b>	v0gateway
<b>Advertiser</b>	IoAdDatabase

The Acceptance Testing Organization will initially populate databases using the Test Data CM System (TDCMS) to provide for configuration management (CM) of test data files using a simple but well organized directory structure and UNIX file protection utilities on ECS Mass storage devices. The TDCMS allows users (developers, integration and test personnel) easy access to the data for test purposes. Additionally, TDCMS provides a mechanism to allow users to change existing test data files without destroying the originals. Initial population of the test data directories will be done in coordination with the Test Data Set Working Group, which has representation from Development, Science Data Engineering, System Verification and Acceptance Test (part of System Management Office), and the EOSDIS Ground System (EGS) Integration & Test Contractor.

The TDCMS is designed to handle test data, which is defined as data from the Instrument Teams, metadata, DAPS, and heritage data from external sources, as well as simulated data and supporting products generated in-house [such as data from the EOSDIS Test System (ETS) Simulated CCSDS Telemetry Generator (SCTGEN) subsystem, or Metadata Editing Utility (mdedit) developed by ECS for editing EOS-HDF file metadata]. TDCMS provides a central point of contact for receipt, logging and archiving of test data received from external sources

such as Instrument teams, ESDIS, Landsat LPS, NOAA, etc. A formal process governs receipt and logging of database elements as illustrated in figure 3-3.



**Figure 3-3. Data Receipt, Logging and Validation Process**

Databases resulting from Acceptance Test, EGS Certification, and DAAC Exercises evolutions will be turned over to Maintenance and Operations following the ORR. M&O will utilize a similar process to populate databases during operations according to DID 611 procedures. Specific site, user, and mission oriented data will be added under direction from the Science PCMB and local Configuration Control Boards.

#### **3.1.5.2.2 Specification**

ECS data requirements specifications are provided in DID 311, Database Design and Database Schema Specification.

#### **3.1.5.2.3 Schedule/Status at Custom Software Turnover**

ECS will be installed at each site after CST with functionally tested, but empty databases other than test data.

#### **3.1.5.2.4 ECS M&O Responsibilities**

ECS M&O will be responsible for initializing all operational databases to achieve readiness for operations.

#### **3.1.5.3 Operational Procedures Preparation**

##### **3.1.5.3.1 Purpose**

ECS Release 2.0 will be delivered with procedures and instructions for effective operation of the system. Operations procedures are defined as the step-by-step commands or on-line procedures needed to perform a function. The Operations Instructions are the off-line procedures or

directives for performing administrative, operations, management or operations support activities, e.g., Configuration Management, Problem Management, Performance Reporting, etc. Each DAAC may write site-specific procedures and instructions to accommodate site-specific M&O requirements. System-level procedure changes must be reviewed for impact analysis and approval by the Science Systems PCMB.

#### **3.1.5.3.2 Specification**

ECS Operational Procedures are documented in DID 611.

#### **3.1.5.3.3 Schedule**

The initial ECS Release 2.0 procedures will be delivered with the drop 1 increment. A site-specific update to the initial delivery must be completed by each site before Release 2.0 ORE and ORR.

#### **3.1.5.3.4 ECS M&O Responsibilities**

The delivered procedures will be used to support ECS Acceptance Testing and Operational Exercise development by ECS M&O personnel as part of the AT Team. The ECS M&O staff will mark-up the procedures in actual test operation to reflect desired changes. The mark ups will later be used by M&O personnel to create an updates to the procedures before the start of ECS ORE.

#### **3.1.5.4 ECS M&O Staffing**

##### **3.1.5.4.1 Purpose**

ECS maintenance and operations organizations must recruit, hire, and schedule ECS M&O personnel to be ready to operate each site to the required level of performance commensurate with ECS operating plans and program milestones.

##### **3.1.5.4.2 Specification**

ECS operations positions are identified and described in the CDRL for DID 607 and suggested staffing levels are given in the CDRL for DID 608.

Staffing levels for each position are as required by local site management plans in response to ESDIS direction.

##### **3.1.5.4.3 Schedule / Status at Custom Software Turnover**

This topic is covered in section 3.1.8 Operations Staffing Verification Matrix.

##### **3.1.5.4.4 ECS M&O Responsibilities**

Local site managers must provide staffing as required.

### **3.1.5.5 Logistics Systems Preparation**

#### **3.1.5.5.1 Purpose**

Logistics support plans provide for ECS maintenance and sparing of ECS sites in coordination with local site M&O personnel.

#### **3.1.5.5.2 Specification**

ECS logistics requirements specifications are provided in DID 613, Release 2.0 COTS Maintenance Plan.

The Release 2.0 COTS Maintenance Plan addresses the Release 2.0 maintenance concept and the responsibilities of the ECS Project for the commercial off-the-shelf hardware and software supplied by the ECS Contractor and Government Furnished Equipment (GFE). The plan identifies the sources of maintenance support at ECS sites, periods of coverage, and responsibilities of the M&O staff and contracted maintenance providers. ECS sites included for maintenance support include GSFC, LaRC, NSIDC, EDC, and the EDF.

An overview of planned logistics provisions is provided below to present a complete summary of operational readiness actions in the period just before, and during, early system operations. The actual, specific logistics provisions found in updated, approved plans and procedures will supersede this overview.

#### **3.1.5.5.3 Schedule**

ECS COTS hardware and software is under vendor maintenance at ECS turnover when system operations commence.

Maintenance coverage during operations will sustain mission-critical operations. Generally, the principal period of maintenance (PPM) at the DAACs, EOC, SMC, and EDF will be 8AM to 5PM local, Monday through Friday, excluding local holidays.

Third-party maintenance providers and OEMs under maintenance have a 4 hour on-site response time after being notified of an equipment failure during the principal period of maintenance (PPM). Response for contracted maintenance support outside the PPM is provided on an as-required basis. If failures occur outside the PPM, the site should consider deferring OEM or maintenance subcontractor response until the next day if the malfunctioning system is not critical to ECS operations. This includes maintenance actions that would extend outside the PPM hours.

#### **3.1.5.5.4 ECS M&O Responsibilities**

Working under the general direction of the ECS M&O Manager, the ECS ILS Manager manages the ECS COTS maintenance program and other logistics operations. This includes the budget and expenditures associated with COTS Hardware and Software maintenance and the provisioning of spares in support of maintenance operations. The ILS Office (ILSO) assists ESDIS in the development of ECS COTS Hardware and Software maintenance policy; monitors

and coordinates maintenance operations at the ECS sites; and manages maintenance support provided by vendors and OEMs.

Daily management and execution of DAAC, SMC, and EOC Hardware and Software maintenance is under the operational control of the DAAC, SMC, and EOC managers. Each site has a designated local maintenance coordinator (LMC) who executes maintenance support at the site, including problem diagnosis and isolation, maintenance support coordination, problem resolution, and recording COTS Hardware/Software maintenance actions performed at the site.

### **Problem Resolution.**

The principal COTS Hardware and Software maintenance resource at the sites is the local maintenance coordinator (LMC), who also functions as the site's maintenance engineer. The LMC performs the initial fault diagnostics to isolate the cause of COTS Hardware and Software problems; determines the source of the maintenance support for the failed unit; and records the problem and its resolution into the management systems. The LMC may be the principal maintenance source for selected equipment having high  $A_o$  and or low MDT requirements. As a principal maintenance source, the LMC is responsible for isolating failures to the LRU and replacing it with an on-site spare. This self-maintenance approach provides faster maintenance response than contracted maintenance support. The LMC is immediately available, understands the ECS architecture and operational requirements, and represents a lower cost maintenance approach for certain critical equipment.

The LMC is assisted by the site's system and network administrators to isolate and resolve problems. The DAAC's local help desk (for science user problems) and systems administrators (for operator problems) initiate the maintenance action by preparing a Trouble Ticket. The trouble Ticket is forwarded to the System Administrator to isolate the problem to one of the following:

- a. System configuration -- System administrator resolves
- b. Network configuration -- Network administrator resolves
- c. Custom software (i.e. ECS custom Software or science Software) -- Sustaining engineers resolve
- d. COTS Software -- LMC and sustaining engineers resolve with Software vendor support
- e. COTS Hardware -- LMC resolves with OEM or maintenance subcontractor support

Trouble Tickets are monitored until problems are resolved and their resolution verified. Once verified, the system administrator or the LMC closes the Trouble Tickets and updates the Baseline Manager (if a change to the configuration baseline was required). Changes to custom Software are accomplished by ECS sustaining engineers using the Software configuration management system (i.e. ClearCase) following the ECS M&O CM Plan and DID 611 Configuration Management Procedures.

The LMC coordinates resolution of COTS Hardware and Software maintenance actions. If problems cannot be corrected using site or contracted maintenance support resources, the LMC can escalate the problem to the SMC or the ILS Maintenance Coordinator

### **SMC Support.**

The SMC provides support for developed application Software, network, and design problems and monitors Trouble Tickets logged by the sites. Using the Trouble Ticketing system to recall similar problems, the SMC can assist the sites in problem diagnosis/ resolution through reviewing previous configuration changes and problems reported against the equipment and subsystems. The SMC can also review similar problems experienced at other DAACs to identify possible causes and offer corrective actions.

### **Spares Provisioning.**

Spare parts may be provisioned at the sites to ensure replacement COTS LRUs are available to effect the immediate repair of failed critical equipment. These sparing determinations are documented in the Replacement and Spare Parts List (DID 618). Spares provisioning levels may be adjusted after sufficient failure data is gathered during ECS operations to warrant adjusting site spares quantities and types. Spares used at the sites are reported to the ILS Maintenance Coordinator, who will replenish site stocks, as needed. The use and replenishment of site spares is monitored by the ILS Maintenance Coordinator.

## **3.1.6 ECS Release 2.0 M&O Checklists**

The operational checklists are tabular listings per site of critical requirements that must be verified to assure mission success that were derived from the efforts of the ECS Operations Working Group. Each list has a specific site-oriented mission view from an operator/ staff context. The lists are an extensive five part presentation of items that will be verified at each site and reviewed/ reported at the ORR meetings. The detailed checklists are in appendix B.

## **3.1.7 Use Of On-Site Documentation**

### **3.1.7.1 DAAC Tailoring of ECS Documents**

After delivery to the DAACs, the documents and/or documentation described in Table 3-4 and expanded upon in Appendix C of the white paper: 212-WP-002-001 *Game Plan for the ECS Project*. are tailored by the DAACs to their operational environments. For example, Mission Operations Procedures in DID 611 describe a generic set of operational procedures that are the starting point for tailoring by the DAACs to account for DAAC-unique missions and DAAC-unique hardware configurations. Changes or updates to documents and/or documentation associated with incremental deliveries are provided by ECS. DAAC-tailored documents and/or documentation are managed and controlled by the DAACs in accordance with the "Policies of the Distributed Active Archive Centers, October 1997" which is maintained by ESDIS.



### 3.1.7.2 Release 2.0 Document Plan

The documents required in association with Release 2.0 are identified within the entire CDRL list in Appendix C of the white paper: 212-WP-002-001 *Game Plan for the ECS Project*. The organization and/or individual responsible for each document is presented along with when it is to be delivered.

### 3.1.7.3 Minimum At Launch Documentation

In conjunction with the recent Release B to Release 2.x replanning activities, the schedule for documentation preparation and delivery has been adjusted. The following table presents those documents considered to be absolutely necessary to support maintenance and operations at launch of AM-1. These are the documents that ECS will initially concentrate its resources on producing to ensure their timely availability. These documents are also identified in Appendix C of the white paper: 212-WP-002-001 *Game Plan for the ECS Project*, but are presented separately here for special consideration.

**Table 3-4. Minimum Required Documentation At Launch**

Document Titles	Relevant CDRLs
M&O Position Description	607
Science User's Guide & Ops Procedures Handbook	205, Vol. 1-3 & 205, Vol. 4
Operations Tools Manual	609
Mission Operations Procedures	611
SSI&T Handbook (Greenbook)	N/A
As Built Design (Programmer's Guide)	305
ICDs and IRDs	209/219
Security Risk Management Plan	627
COTS Maintenance Plan	613
Developed Software Maintenance Plan	614
Special Maintenance & Test Equipment	615
Integrated Logistics Support Plan	616
Test & Support Equipment Requirements List	619
VDD	non-CDRL
As Built DAAC Facility Plan	302
Replacement Parts List & Spare Parts List	618
Database Design and Database Schema Specifications	311
ECS System Acceptance Test Procedures	411
ECS System Acceptance Test Report	412
ECS System Integration & Test Procedures	322, 414
ECS System Integration & Test Report	324, 405

Final versions of draft documents listed in the previous table will be delivered at launch - 30 days (see white paper: 212-WP-002-001 *Game Plan for the ECS Project*, Appendix C).

#### **3.1.7.4 Design Documentation**

Recognizing the need for more complete and current documentation, Systems Engineering and Development have teamed to develop critical information required for Release 2.0 prior to launch. Systems Engineering and a lead from Development will capture relevant information via videotaped interviews with key software developers. Interviews will run from two to four hours and concentrate on key design and functional aspects of each subsystem. Prior to the interviews all available informal documentation will be gathered together and made available. Informal documentation may consist of redlined object models, internal presentations, design notes, or any existing aids deemed useful by the developer.

Working from informal materials, notes, videotapes, and additional analysis, Systems Engineering staff will develop initial draft descriptions for the Operations Tools Manual (DID 609) and Configuration Item (CI) descriptions which can be incorporated in the appropriate Segment/Design Specifications (see white paper: 212-WP-002-001 *Game Plan for the ECS Project*, Appendix C). Software developers will review and annotate draft material once, and perhaps twice, after which it will be incorporated in the appropriate document and placed under configuration control.

Recognizing there are areas which require specific knowledge (such as Rogue Wave), Systems Engineering is investigating contracting with a local firm. However, the effort described above is proceeding irregardless.

This planned approach provides multiple benefits: essential documentation will be developed; impact to Development staff will be minimized; and Systems Engineering staff will gain additional knowledge of the software design and functionality.

#### **3.1.7.5 Site Documentation**

SEO will establish a baseline document repository for the maintenance of site-level documentation. It will take the form of a website which will contain the master copy of such documentation. The site specific information will be maintained under site-level CM control which will affect the release version with site unique changes. The sites will receive a release version of the documentation and will utilize the SEO Librarian to post site-unique updates to the documentation on the central website for common use by development, maintenance, program management, and other sites.

The details of the file structures are still being worked out. The process for updates and maintenance will be documented in the DID 611 Operations Procedures section 9 CM Procedures and section 20 Library Administration. The present version of these files is located at the URL: <http://pete/baseline/docs/>. Site-specific documents posted include EDC, GSFC, LaRC, NSIDC, SMC, Mini-DAAC, VATC, and VATC-SMC.

### **3.1.8 Operations Staffing Verification Matrix**

#### **3.1.8.1 Staff Readiness**

The site managers will report on readiness at the ORR. The report should nominally cover SSI&T, Ingest, Archive and Distribution, Production, Infrastructure, Engineering and Management functions. See the allocation of mission function against staff position in the verification matrix in section 3.1.8.3. The major staff divisions are Management, Engineering, and Infrastructure which are static components of every DAAC. The dynamic components of staff are mission driven such as Archive/ Distribution and Production.

Staff readiness should be analyzed according to the following criteria:

- Role and responsibilities by function, e.g., the scope of operator activities involved in ingesting data from an instrument team; coordinating with data providers; or other functions.
- Indications of sensitivity to changes for each function, e.g., 50% increase in PGEs requires adding a second shift or 50% increase in orders requires adding another distribution staff billet
- Number of staff and shift coverage
- Future levels and operations milestones
- Training and procedure development as a burdening factor to certain positions

#### **3.1.8.2 Schedule / Status**

Staffing levels increase from beginning levels at Custom Software Turnover to critical staffing at ECS ORR and beyond. Current plans specify the shift operations indicated in Table 3-5, Shift Operations Requirements by Release 2.0 Milestone

**Table 3-5. Shift Operations by Release 2.0 Milestone**

Milestone	Location	Hours	Shifts
<b>Testbed</b>	GSFC DAAC	8 X 5	1
	GSFC SMC	-	-
	LaRC DAAC	8 X 5	1
	EDC DAAC	8 X 5	1
	NSIDC DAAC	8 X 5	1
<b>ORR</b>	GSFC DAAC	16X 5	2
	GSFC SMC	24X 5	3
	LaRC DAAC	8 X 5	1
	EDC DAAC	8x5	1
	NSIDC DAAC	8 X 5	1
<b>AM-1</b>	GSFC DAAC	24 X 5.5	3
	GSFC SMC	24 X 7	3
	LaRC DAAC	16 X 7	2
	EDC DAAC	16 X 7	2
	NSIDC DAAC	8 X 5	1
<b>8/98</b>	NSIDC DAAC	8 X 7	1

### **3.1.8.3 Staffing Verification Matrix**

The following matrices are derived from the DID 607 defined positions. It defines a base-level staffing that would be adjusted up or down to tailor the site level mission requirements and characteristics.

**Table 3-6. SEO Staffing Verification Matrix**

<b>Mission Function</b>	<b>SEO Position</b>
Engineering	Systems Engineer
Engineering	SW Maintenance Engineer
Engineering	System Test Engineer
Infrastructure	ILS (Admin, Logistitian, Installer, Property Mgr.)
Infrastructure	ILS Maintenance Coordinator
Infrastructure	Operations Trainer
Infrastructure	CM Administrator
Infrastructure	System Administrator
Infrastructure	Science Coordinator
Infrastructure	Librarian
Management	ECS Contract Managers & SEO AAs
Management	Ops Readiness & Performance Assurance Analyst

**Table 3-7. SMC Staffing Verification Matrix**

<b>Mission Function</b>	<b>SMC Position</b>
Infrastructure	Operations Supervisor
Infrastructure	Performance Analyst
Infrastructure	Network Analyst
Infrastructure	CM Administrator
Infrastructure	ECS USWG Liaison
Infrastructure	SMC Maintenance Coordinator
Infrastructure	Billing Clerk
Infrastructure	Accountant
Infrastructure	Security Controller
Infrastructure	Resource Manager
Infrastructure	Fault Manager
Infrastructure	Computer Operator
Infrastructure	System Administrator

**Table 3-8. DAAC Staffing Verification Matrix**

<b>Mission Function</b>	<b>DAAC Position</b>
Archive / Distribution	Archive Manager
Archive / Distribution	User Services Representative
Archive/ Distribution	Ingest/ Distribution Technician
Engineering	Assistance Engineer
Engineering	Systems Engineer
Engineering	SW Maintenance Engineer
Engineering	System Test Engineer
Infrastructure	Database Administrator
Infrastructure	CM Administrator
Infrastructure	Property Manager
Infrastructure	Resource Planner
Infrastructure	Maintenance Coordinator
Infrastructure	Resource Manager
Infrastructure	Computer Operator
Infrastructure	Computer Systems Administrator
Management	ECS Contract Manager
Management	Administrative Assistant
Management	Ops Readiness & Performance Assurance Analyst
Production	Science Data Specialist
Production	Science SW I&T Support Engineer
Production	Science Coordinator
Production	Operations Supervisor
Production	Production Planner
Production	Production Monitor/ QA

### **3.1.9 ECS M&O Training and Certification Requirements**

#### **3.1.9.1 Purpose**

Readiness for ECS Release 2.0 requires that M&O personnel be given training in the operation of the ECS and the COTS products that are integrated with the system. The ECS SEO will conduct classroom training in ECS operation. COTS training provisions have been made in M&O budgets for each operating location and must be applied as required by each site manager.

#### **3.1.9.2 Specification**

ECS Release 2.0 training plans are described in DID 622. ECS operations training course materials are provided in DID 625. ECS Certification Requirements are described in DID 626.

### **3.1.9.3 Schedule/Status at Custom Software Turnover**

ECS Release 2.0 training will be conducted at the Release 2.0 DAACs in the period between Testbed and ORR.

### **3.1.9.4 ECS M&O Responsibilities**

Training will be conducted at the DAAC facilities. It is the responsibility of the local manager to arrange training facilities, schedule work schedules for trainees to allow class attendance without disruption, and make the ECS system available as required to support hands-on training periods.

## **3.2 ECS Operational Readiness Exercises (ORE)**

### **3.2.1 Introduction**

This section describes a hierarchy of system readiness verification:

- DAAC Functionality and Interfaces
- ECS User Connectivity
- ECS System Functionality and Internal Interfaces
- ECS External Interfaces

The hierarchy of sometimes overlapped and dependent activities begins with each DAAC verifying internal readiness, continues with emulated user connection, expands to inter-DAAC, and DAAC to EOC connectivity, and then to ECS system network readiness verification, and concludes with verification of operability of ECS system connectivity to external systems. The readiness verification activity culminates in an Operational Readiness Review which declares the ECS ready to support system operations.

### **3.2.2 Purpose**

ECS Operational Readiness Exercises (ORE) will be conducted to determine the readiness of each ECS element to provide services. These exercises will be held at site facilities, under the coordination of an ECS test director, to verify that the functional capabilities of each site are ready to support integrated operations. The ORE will concentrate on operational procedures, human interfaces, and operational M&O databases.

### **3.2.3 Scope**

The ORE will verify that all ECS Release 2.0 AM-1 operational elements are ready to support AM-1 mission operations. This includes the GSFC DAAC, the LaRC DAAC, EDC DAAC, and the SMC.

### **3.2.4 Prerequisites**

Required System I&T and Acceptance Testing must have been executed at all ECS Release A elements with no outstanding critical failures.

### **3.2.5 Success Criteria**

The ECS Release 2.0 will be considered ready for operational use when the following events have been completed to the satisfaction of all system decision authorities:

- all defined site operational readiness exercises have been completed.
- all ECS Release 2.0 system operational readiness exercises have been completed.
- all external interfaces have been verified.
- User accessibility has been verified.
- No critical NCRs that would preclude satisfactory operations remain open.
- ECS Decision authorities agree, in the ORR, that all criteria have been satisfied and the system is ready to support user operations.

### **3.2.6 Schedule/Agenda**

The DAAC ORE will be completed in approximately 4 weeks accomplishing the activities shown in Table 3-9, AM-1 ECS Release 2.0 DAAC Operational Readiness Activities. The specific DAAC mission-test activities are listed in the respective *Operations Rehearsal Plan for EOS AM-1* for GDAAC, EDC and LaRC. The exercises have been prioritized and categorized Launch Critical and Launch Essential. Launch Critical is that set of ECS capabilities that are the minimum to be available and are guaranteed at launch, i.e., if they are not available, it may cause a launch delay, viz., command and control for FOS or samples of level Ø data to allow control of instruments. Launch Essential defines additional capabilities to be implemented as time and resources allow, i.e., minimum capabilities to be a success.



**Table 3-9. AM-1 ECS Release 2.0 Operational Readiness Activities**

Week	Topic	Description	Duration
<b>One</b> <b>One- Two</b>	Exercise Plan Review	Network Conference	Day 1
	Site Verifications		
	• SMC	- HW, SW, DB Version - SMC Operation - SMC I/Fs	Day 2 Day 3-4 Day 5+
	• GSFC DAAC	- HW, SW, DB Version - GSFC Operation - GSFC I/Fs - User Emulation	Day 2 Day 3-10 Day 5 Day 5
	• LaRC DAAC	- HW, SW, DB Version - LaRC Operation - LaRC I/Fs - User Emulation	Day 2 Day 3-10 Day 5 Day 5
	• EDC DAAC	- HW, SW, DB Version - EDC Operation - EDC I/Fs - User Emulation	Day 2 Day 3-10 Day 5 Day 5
<b>Three</b>	ECS System Verification	- HW, SW, DB Version - Inter-DAAC Operation	Day 1 Day 2+
<b>Four</b>	ECS External I/Fs	System Level I/F Version	Day1-5

### 3.2.7 Roles and Responsibilities

Many organizations and people from across the ECS Release 2.0 system will perform the exercises required to demonstrate that the system and all of its components are ready to perform user operations. The role and responsibilities of the various organizations and people are shown in Table 3-10, ECS Release 2.0 ORE Roles and Responsibilities.

**Table 3-10. ECS Release 2.0 ORE Roles and Responsibilities**

Role	Function	Organization
<b>Test Director</b>	ECS Operational Readiness Decision Authority	ESDIS
<b>Test Conductor</b>	Initiates, coordinates, reviews progress	ECS M&O
<b>Quality Office</b>	1. Monitors procedures 2. Records results 3. Records NCRs	ECS QPO
<b>ECS Rel A Sites</b>		
<b>SMC</b>		
• <b>Site Manager</b>	Site Decision Authority	SMC
• <b>Site Engineer</b>	Site Verification Lead	SMC
<b>GSFC DAAC</b>		
• <b>Site Manager</b>	Site Decision Authority	GSFC DAAC
• <b>Site Engineer</b>	Site Verification Lead	GSFC DAAC
<b>LaRC DAAC</b>		
• <b>Site Manager</b>	Site Decision Authority	LaRC DAAC
• <b>Site Engineer</b>	Site Verification Lead	LaRC DAAC
<b>AM-1 Project Office</b>	1. Observer 2. Consultant	AM-1 Project Office
<b>ECS ATO</b>	1. Observer 2. Consultant	ECS ATO
<b>EGS Project Office I&amp;T</b>	1. Observer 2. Consultant	ESDIS I&T Manager

### 3.2.8 Exercise Levels

#### 3.2.8.1 Site Exercises

##### 3.2.8.1.1 Verification of System Status

These exercises verify that all ECS subsystems are on-line and operational. For example, using procedures from DID 611, Section 7, System Monitoring, status verification will be conducted of all managed systems at each site. This is accomplished by bringing up the IP map in HP OpenView, and confirming that all icons are in the “green” state. This confirms that the LSM at the SMC is on-line and operational, and that local network nodes are present. This test must be completed before continuing on to Verification of Communication Software Status.

<b>DID 611, Section 7, System Monitoring - HP OpenView</b> <ul style="list-style-type: none"> <li>• Looking at Maps for New Nodes 7.1.4</li> <li>• Checking for Event Notifications 7.1.6</li> <li>• DID 611 Operating Procedures</li> </ul>	The purpose of this test is to verify that all systems are operational and on-line.
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As part of the Certification Test development process it will be necessary to identify all essential operational activities which occur during a day, at each DAAC. This will include all operational activities along with the frequency and times of occurrence during a day. The Timeline Charts will be used as a master reference to develop the “3 Days in the Life” Certification Test scope, and will be cross-referenced to test packages and DAAC operations procedures which verify the activities. The activity has been initiated where EGS I&T prepared a consolidated list of activities and Timeline Charts for each DAAC. These have been revised in joint meetings, and will continue to be updated with detailed inputs from each DAAC. These are documented in the Draft *EGS Science System and Operations Certification Plan Development Process* document, 11 November 1997 version.

### 3.2.8.1.2 Verification of Communication Software Status

This exercise of Acceptance Test Procedure sequences verify the capability of the user/operators at each site to receive and handle broadcast messages. Users/operators at the SMC broadcast messages to the DAACS, receive messages and receipt acknowledgments.

<b>Inter-DAAC and DAAC-SMC Communications</b> <b>ATO Test Procedure No.: A120110.020\$S</b>	The procedure tests the capability of the SMC to send messages to and receive messages from the Release A DAACs, TSDIS, EBnet, the EOC.
<b>ECS Internal Interfaces</b> <b>ATO Test Procedure No.: A080180.090\$S</b>	This test case verifies the capability for the SMC to communicate with the , GSFC, LaRC, EDC, and EOC.

### 3.2.8.2 ECS System Readiness Exercises

The primary purpose of this exercise sequence is to assure that the staff can access M&O services, via appropriate interfaces, allowing them to select the correct M&O interface to ECS subsystems from local and remote terminals. This sequence verifies the basic connectivity and fundamental protocols for LARC ECS DAAC external and internal interfaces in support of Release 2.0 operations.

<b>DAAC M&amp;O Interfaces</b> <b>ATO Test Procedure No.: A080160.010\$G</b>	Demonstrates that M&O interfaces, provided for LaRC DAAC ECS subsystems are accessible and functioning and that these interfaces are sufficient to support planned operations and maintenance activities. Demonstrate that the M&O interface provides access to on-line services for Accountability, Fault Management, Performance Management, and Report Generation. Demonstrates that other on-line services are available for three aspects of security management network, communications and host processors along with general message exchange services to support E-mail, FTP file access, Bulletin Board, and Virtual Terminal capabilities. Demonstrates that the M&O interface provides access to off-line configuration control services to support Baseline Management, Software Change Management, Change Request Management, Software Distribution Management, and Software License Management. Demonstrates that the M&O interface provides access to off-line resource management services to support management, Logistics management, Training and Policies & Procedures management using Office Automation tools.
<b>LARC DAAC External Interfaces</b> <b>ATO Test Procedure No.: A080180.050\$G</b>	This test case verifies LARC ECS DAAC connectivity with ECS external systems using the File Transfer Protocol.

EGS I&T has developed a series of Interface, Qualification, and System Level Tests as part of EGS Test Program which will be modified to become the joint EGS Science System and Operations Certification tests. The formal Interface tests may be incorporated as part of the Qualification tests. The Qualification tests will be modified jointly with the DAACS and be conducted as part of joint System Readiness Tests. The Qualification Tests will also be coordinated with the ECS developer SDP Acceptance Test Scenarios. The Qualification tests are prerequisites to the EGS system level Science & Operations Certification Tests. The five system level tests given as

EGS5	ECS to Landsat 7 Interoperability Confidence Test
EGS7	EGS Security Confidence Test
EGS9	ASTER Science Operations Confidence Test
EGS10	AM1 Science Data Processing End-To-End Confidence Test
EGS11	EGS Science Data System Performance Test

will be modified to include the DAAC Operations Procedures for Science System/ Operations Certification. A description of these tests is documented in the Draft *EGS Science System and Operations Certification Plan Development Process* document, 11 November 1997 version.

The scope of these tests will reflect the DAAC Daily Activities /Timelines discussed in 3.2.8.1.1 of this document.

### **3.3 ECS Release 2.0 Operational Readiness Review (ORR)**

#### **3.3.1 Purpose**

The ECS Release 2.0 Operational Readiness Review (ORR) will be conducted to determine the readiness of each ECS element to provide operational services. The review will be conducted in a distributed manner, via teleconference, with DAAC, SMC, and EOC personnel at their own facilities, under the coordination of a test director/chairperson at the SMC. The ORR will concentrate on confirming the operational readiness of hardware and software, operational procedures, human interfaces, and operational M&O database readiness.

#### **3.3.2 Scope**

The ORR will confirm that the GSFC DAAC, the LaRC DAAC, EDC DAAC, and the SMC are ready to support the ECS Release 2.0 AM-1, L-7, and SAGE-III mission operations.

#### **3.3.3 Prerequisites**

The ECS Release 2.0 ORR will be held when:

- all defined site operational readiness exercises have been completed.
- all ECS Release 2.0 system operational readiness exercises have been completed.
- all external interfaces have been verified.
- User accessibility has been verified at site and system levels.
- No critical Trouble Tickets that would preclude satisfactory operations remain open.

#### **3.3.4 Success Criteria**

Satisfactory completion of ECS Release 2.0 Operational Readiness Review requires that the criteria specified in Table 3-11, ORR Success Criteria, be met.

**Table 3-11. ORR Success Criteria**

Criteria	Conditions		
<b>Sites ORE Completed</b>	<p>All ORE must have been successfully completed indicating:</p> <ol style="list-style-type: none"> <li>1. All Operations positions are staffed.</li> <li>2. Staff certifications are completed.</li> <li>3. All required operations hardware and software is operating in the "Green" (HP OpenView).</li> <li>4. Operations databases are initialized and on-line.</li> <li>5. Communications with all ECS elements has been verified.</li> <li>6. ECS accessibility from selected user locations has been verified.</li> <li>7. Communications with ECS external interface systems has been verified</li> <li>8. No critical Trouble Tickets outstanding</li> </ol>		
<b>System ORE Completed</b>	<p>All ORE must have been successfully completed indicating:</p> <ol style="list-style-type: none"> <li>1. All Operations positions are staffed.</li> <li>2. Staff certifications are completed.</li> <li>3. All required operations hardware and software is operating in the "Green" (HP OpenView).</li> <li>4. Operations databases are initialized and on-line.</li> <li>5. Communications with all ECS elements has been verified.</li> <li>6. ECS accessibility from selected user locations has been verified.</li> <li>7. Communications with ECS external interface systems has been verified</li> <li>8. No critical Trouble Tickets outstanding</li> </ol>		

### 3.3.5 Schedule/Agenda

The ORR will be completed in one day accomplishing the activities shown in Table 3-12, ORR Agenda.

**Table 3-12. ORR Agenda**

Topic	Description	Responsible	Duration
Introduction	Describe purpose, agenda, roles, schedule	ESDIS	30 Min
ORE Review	Review ORE results by site <ul style="list-style-type: none"><li>• SMC</li><li>• EDC DAAC</li><li>• GSFC DAAC</li><li>• LaRC DAAC</li><li>• EGS Certification Results</li><li>• Instrument Team Assessment</li></ul>	SMC Manager ORPA Manager ORPA Manager ORPA Manager EGS Manager IT Reps	60 Min 60 Min 60 Min 60 Min 60 Min 60 Min
NCR/Lien Review	Review status of Critical Liens	CM	30 Min
Panel Discussion	Discuss findings, determine consensus for operational readiness	ESDIS, Site Managers	60 Min
Panel Recommendation	Report Operational Readiness Determination	ESDIS	15 Min

### 3.3.6 Roles and Responsibilities

Many organizations and people from across the ECS Release 2.0 system will perform the exercises required to demonstrate that the system and all of its components are ready to perform user operations. The role and responsibilities of the various organizations and people are shown in Table 3-13, ECS Release 2.0 ORR Roles and Responsibilities.

**Table 3-13. ECS Release 2.0 ORR Roles and Responsibilities**

Role	Function	Organization
Test Director	ECS Operational Readiness Decision Authority	ESDIS
Test Conductor	Initiates, coordinates, reviews progress	ECS M&O
Quality Office	1. Monitors procedures 2. Records results 3. Records TT/ NCRs	ECS QPO
<u>ECS Rel 2.0 Sites</u>		
SMC		
• Site Manager	Site Decision Authority	SMC
• Site Engineer	Site Verification Lead	SMC
GSFC DAAC		
• Site Manager	Site Decision Authority	GSFC DAAC
• Site Engineer	Site Verification Lead	GSFC DAAC
• Site ORPA	Site OR Lead	GSFC DAAC
LaRC DAAC		
• Site Manager	Site Decision Authority	LaRC DAAC
• Site Engineer	Site Verification Lead	LaRC DAAC
• Site ORPA	Site OR Lead	LaRC DAAC
EDC DAAC		
• Site Manager	Site Decision Authority	EDC DAAC
• Site Engineer	Site Verification Lead	EDC DAAC
• Site ORPA	Site OR Lead	EDC DAAC
MissionProject Office	1. Observer 2. Consultant	MissionProject Office
ECS ATO	1. Observer 2. Consultant	ECS ATO
EGS Project Office I&T	1. Observer 2. Consultant	ESDIS I&T Manager



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## **4. GSFC DAAC ECS Release 2.0 Operational Readiness**

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This section presents a model Operations Readiness Plan for GSFC DAAC. It is meant to provide an example for all the DAACs to draft an ORP.

Release 2.0 of the ECS provides GSFC with mission and operations functionality to support the Moderate-Resolution Imaging Spectroradiometer (MODIS) Science Computing Facility (SCF). This DAAC provides support to the MODIS SCF for the integration of Version 1 science software into the Science Data Processing Segment (SDPS) for EOS-AM-1 early interface testing.

This operational readiness plan identifies the activities and events that will occur at the GSFC DAAC as part of the ECS Release 2.0 system turnover, and the necessary support that M&O personnel must provide to support the turnover activities. Further, the plan identifies the actions required of M&O to prepare the turned over system for actual user operations, and to verify that it is ready to commence such operation.

The M&O Operational Readiness and Performance Assurance function supports ECS operations at all locations. It is the focal point for the planning and monitoring of all training, operational exercises, operator certification, and support for system rehearsals and certification, including the preparation of operations procedures and building of data bases. It is also the focal point for monitoring and reporting on the performance of those aspects of the Release which are currently supporting operations.

### **4.1 Prerequisites to GSFC DAAC ORE and ORR**

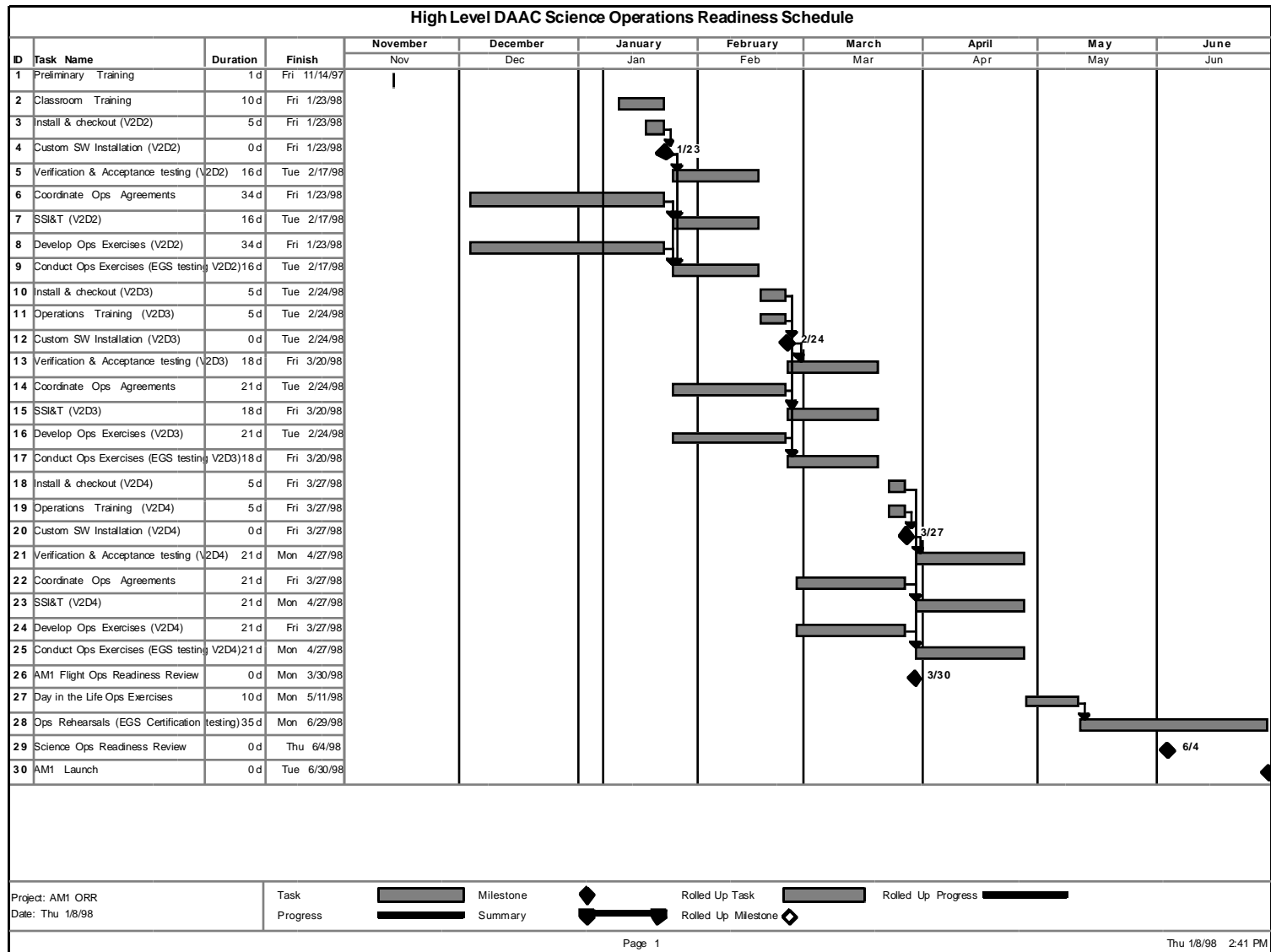
The ECS Release 2.0 Master Schedule includes a number of significant events occurring prior to, and prerequisite to, the beginning of system maintenance and operations activities. All Release 2.0 organizations will be affected to some extent, and must therefore have a role in supporting, these events.

This section identifies the major ECS Release 2.0 GSFC DAAC activities and events which must be successfully completed prior to M&O exercises to determine readiness to perform system operations.

#### **4.1.1 ECS Release 2.0 System Turnover Activities**

The ECS Release 2.0 delivery for the start of site M&O activities occurs at the Release Readiness Review. At this point the system transitions from the development and test phase to the maintenance and operations phase. Prior to that transition, M&O emphasis will be on support for the integration and test of the system.

Figure 4-1, GSFC DAAC Activity Schedule, shows the currently scheduled ECS Release 2.0 turnover activities planned at GSFC. Each turnover event, and its required site support, are addressed in the subsections that follow.



**Figure 4-1. GSFC DAAC Activity Schedule**

#### **4.1.1.1 ECS Release 2.0 Acceptance Testing**

The complete set of ECS functions allocated to Release 2.0 are verified in acceptance testing to ensure that the release meets those requirements needed to support AM-1 mission operations. This includes verifying requirements for all features needed to support the ECS Release objectives for spacecraft operations and control, scheduling, data operations, information management and archive, science processing, networks, and system management.

##### **4.1.1.1.1 Purpose**

Acceptance tests include the verification of certain ECS features needed to support AM-1. Acceptance tests also include the verification of interfaces needed to support AM-1.

##### **4.1.1.1.2 Event Schedule**

Acceptance testing begins after a successful Custom Software Turnover (CST). Prior to CST, walkthroughs of the entire Acceptance Test Procedure (DID 411) are conducted at the EDF to ensure proper format, contents, and completeness of the test scenarios and test plan. Additionally, at the GSFC DAAC, concurrent with the execution of I&T, critical acceptance test sequences and test cases are executed by ATO against the I&T baseline to ensure that any major problems with either the Release, or the Acceptance Test Procedures and resources, are found at the EDF where they can be most easily corrected. Differences in the test environments between the EDF and the DAAC(s) are considered by the ATO to account for potential differences in expected test results. Discrepancies observed during acceptance test preparations are formally filed as NCRs and dispositioned.

Two phases of acceptance testing are executed at specified sites. These phases are: site-specific testing, where the focus is on each individual site; and "all up" testing, where the sites and elements are tested simultaneously as a system. In each case, the final scenario to be executed is an acceptance test demonstration, which exercises a comprehensive sequence of events verifying the overall site-specific and ECS-wide capabilities of the Release. Details concerning the test environment and procedures to be followed at test sites are described in the Acceptance Test Procedures (DID 411).

As the acceptance testing proceeds from site to site, discrepancies may be uncovered which were not observed during tests at previous sites. If the mitigation of these discrepancies requires the generation of a new Release version, site specific and regression testing of the new version at each site is the first order of business during the all-up ECS acceptance test.

GSFC ECS Release 2.0 acceptance testing will be conducted during the two month period following the Release 2.0 CST.

A detailed schedule will be coordinated with each site, to minimize disruption to ongoing operations. The final schedule will include dates, times and duration for all formal acceptance testing that occurs at the site.

#### **4.1.1.1.3 M&O Roles and Responsibilities**

The site manager will assign M&O DAAC personnel who will be integrated into the test team to help execute acceptance tests. The early first-hand involvement of the site manager and his operations personnel in site acceptance testing provides the M&O Team with early visibility into each new release and hastens a smooth transition. This involvement and familiarity with ECS software in the stages before release to the user base greatly enhance the effectiveness and productivity of the M&O DAAC staff and positions a highly competent and responsive user support staff on-site at the DAACs. In addition, during the M&O phase, the ATO assists by providing benchmark tests to verify operational performance of the ECS system. The ATO provides acceptance testing procedures for use during the verification of approved changes and enhancements.

#### **4.1.1.1.4 Resource Requirements**

##### **4.1.1.1.4.1 Personnel**

The ATO requests that M&O personnel be designated as part of the test team for the duration of the test period. That will require people from 5 positions at the GSFC DAAC. Two shift operation is required to complete all planned AT procedures as introduced in Table 4-1, ATO M&O Personnel Requirements.

***Table 4-1. ATO M&O Personnel Requirements***

<b>Location</b>	<b>Positions</b>
<b>GSFC</b>	System Administrator Database Administrator Science Data Specialist Archive Specialist CM Specialist

##### **4.1.1.1.4.2 Office Resources**

The AT Team will send up to 27 people to GSFC in the role of AT Lead and AT team members during the AT period. They will require appropriate desk space, telephone, computers with office automation tools, FAX, and copier provision. Use of a conference room or designated work space with tables in the computer room is requested.

##### **4.1.1.1.4.3 System Access**

The AT Team will require complete, dedicated ECS System access during the AT period. Any other system access during this time will require the written approval of the ECS Release 2.0 CCB and the AT Team Leader.

#### **4.1.1.1.4.4 Test Databases**

The AT plan requires that simulated AM-1 data be available for test operations. The AT Team will provide all required test data.

Use of Standard Test Data During Acceptance Testing. Since the AM-1 satellite is not launched prior to this Release, the system is populated with a small amounts of simulated data for AM-1 instruments for use during the acceptance test.

#### **4.1.1.1.4.5 Other Requirements**

Badging and security registration is required to allow test team visitors campus, building, and restricted room access.

### **4.1.2 EGS Integration and Test**

As part of the Certification Test development process it will be necessary to identify all essential operational activities which occur during a day, at GSFC DAAC. This will include all operational activities along with the frequency and times of occurrence during a day. The Timeline Charts will be used as a master reference to develop the “3 Days in the Life” Certification Test scope, and will be cross-referenced to test packages and DAAC operations procedures which verify the activities.

#### **4.1.2.1 Purpose**

The EGS certification will verify the capabilities to support the functions to support the AM-1 mission.

The EGS is supported by:

- EOS Data Information System (EOSDIS) Core System (ECS) Release 2.0.
- EOS Data and Operations System (EDOS) Versions 2 and later 3, and
- EOSDIS Backbone Network (EBnet) phase A.

NASA Institutional elements required to support this testing are: Sensor data Processing Facility (SDPF), the NASA Science Internet (NSI), the Space Network (SN), the Deep Space Network (DSN), NASA Communications Nascom), Ground Network (GN), Wallops Orbital Tracking Station (WOTS), and the Flight Dynamics Facility (FDF).

The EGS I&T Program consists of two main efforts: 1) the Confidence Test Program, and 2) the Flight Projects Joint Testing Program.

The Confidence Test Program focuses on demonstrations of key functionality and mission critical requirements, and emphasizes operability. The objective of the overall EGS I&T Program is to demonstrate and certify EGS Mission Readiness as a precursor to Operations Readiness Testing conducted by the Mission Operations Manager and Science Operations Manager. A continuously evolving set of confidence test packages is maintained at the EGS

Component, EGS Interface, and EGS System levels. The EGS I&T team leads the development and execution of individual confidence test packages. Confidence test packages include test procedures, test data, and other supporting material, and are designed to exercise the system in its final form.

#### **4.1.2.2 Events Schedule**

A detailed EGS Science System and Operations Certification planning and preparation schedule needs to be developed after review and revision of this preliminary set of milestones<sup>5</sup>.

$\Delta_1$  --complete certification timeline definition (per DAAC) for launch version EGS system

$\Delta_2$ – list definition of individual EGS system level certifications tests on a DAAC by DAAC basis, cross-referenced to timeline

$\Delta_3$ – list definition of DAAC specific Operations Procedures, cross-referenced to EGS system level timeline for each DAAC

$\Delta_4$ – complete draft of individual EGS system level certification tests on a DAAC by DAAC basis (TBDs defined for capabilities-requirements test scope, work-arounds, test data)

$\Delta_5$ – Definition of individual DAAC EGS System level Qualification Tests (more detailed than Cert tests; defined prerequisites to cert. Tests)

$\Delta_6$ – 60-day maturity level (i.e. 60 days before test) individual EGS system level certifications tests on a DAAC by DAAC basis (detailed procedures – open TBDs are counted as liens against the test packages) These procedures are dry-run and redlined within 30 days.

$\Delta_7$ – 45-day maturity level individual DAAC EGS System level Qualification Tests (detailed procedures – open TBDs are counted as liens against the test packages) These procedures are dry-run and redlined within 45 days.

$\Delta_8$ – 60-day maturity level individual DAAC EGS System level Operations Procedures Qualification Tests (detailed procedures – open TBDs are counted as liens against the ops procedures. These procedures are dry-run and redlined within 30 days.

$\Delta_9$ – 30-day maturity level individual EGS system level Certification tests on a DAAC by DAAC basis (detailed procedures – open TBDs are counted as liens against the test packages) These procedures are dry-run and redlined within 30 days.

$\Delta_{10}$  – execute individual DAAC EGS System level Qualification Tests (collect formal results, issue DRs/NCRs). Regression test as required.

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<sup>5</sup> The milestone dates are based on the formal ESDIS schedule distributed at the October 23, 1997 DAAC Managers meeting. The maturity milestones reflect a system level Qualification test start date of March 3, 1998, and a Science System and Operations Certification start date of April 15, 1998. Subject to change.

$\Delta_{11}$  – execute individual DAAC EGS System level Operations Procedures Qualification Tests (collect formal results, issue DRs/NCRs). Modify procedures as required.

$\Delta_{12}$  – execute individual EGS system level Certification tests on a DAAC by DAAC basis. (collect formal results, issue DRs/NCRs). Regression test as required. Followed by formal certification assessment report to project; results referenced for ORR,

$\Delta_{13}$  – execute individual DAAC EGS System level Operations Procedures Qualification Tests (collect formal results, issue DRs/NCRs). Modify procedures as required. Followed by formal certification assessment report to project; results referenced for ORR.

#### **4.1.2.3 M&O Roles and Responsibilities**

The EGS I&T Team requests that M&O personnel be designated as part of the test team for the duration of the test period. That will require people from positions at each DAAC at the SMC. One shift operation is required to complete all planned EGS I&T procedures.

#### **4.1.2.4 Resource Requirements**

##### **4.1.2.4.1 Personnel**

EGS I&T requests support from the people/positions as shown in Table 4-2, M&O Personnel Support to EGS I&T, during their activity period at each site.

**Table 4-2. M&O Personnel Support to EGS I&T**

<b>Location</b>	<b>Positions</b>
<b>GSFC</b>	System Administrator Database Administrator Science Data Specialist Archive Specialist CM Specialist

##### **4.1.2.4.2 Office Resources**

The EGS I&T Team will send people to each site in the role of Test Conductor and team members. They will require appropriate desk space, telephone, computer with office automation tools, FAX, and copier provision.

##### **4.1.2.4.3 System Access**

Dedicated ECS system access is required for the entire period of scheduled I&T activity.

User accounts for the test team will be established by ECS Release 2.0 M&O personnel.



#### **4.1.2.4.4 Test Databases**

The EGS I&T Plan requires that selected simulated AM-1 data be available for test operations.

Provision of test data is the responsibility of the EGS I&T Team. They will reuse test databases created for ECS Acceptance Testing and TRMM simulations.

#### **4.1.2.4.5 Other Requirements**

Badging and security registration is required to allow test team visitors campus, building, and restricted room access.

### **4.1.3 ECS GSFC DAAC Release 2.0 Preparation**

#### **4.1.3.1 Configuration Management**

##### **4.1.3.1.1 Purpose**

The objective of Release 2.0 ECS CM activities is to control the baseline configuration of ECS hardware, software, and firmware components deployed to the sites; control changes to these components and associated documentation; and record and report information concerning approved baseline resources changes.

ECS Sustaining Engineering Organization CM activities commence with a hand-off from the Acceptance Test Organization (ATO) at the turnover following formal Physical Configuration Audit (PCA) and Functional Configuration Audit (FCA) of the ECS delivered product. This configuration baseline and any associated liens are recorded in the Version Description Document (VDD).

There are multiple levels of configuration management within the ECS Project. DAAC-level CCBs interact with the Science Systems Program Configuration Management Board (PCMB). The PCMB and the ECS Development CCB interacts directly with the ESDIS CCB. The ECS Release 2.0 CCB manages installation and changes at each location prior to turnover under the governance of the ECS Development CCB and, as necessary, the ESDIS and host center CCBs. The ECS M&O organization at each center supports the host organization CCB. In accordance with the ESDIS Configuration Management Plan, GSFC #423-10-21, and the ESDIS Distributed Active Archive Center (DAAC) Strategic/Management Plan, the ESDIS CCB provides configuration control over all ECS developed CIs.

##### **4.1.3.1.2 Specification**

ECS Configuration Management requirements are provided in the ESDIS CM Plan, Maintenance and Operations Configuration Management Plan for the ECS Project (102-CD-002-001), and the Section 9 CM Procedures of the M&O Operations Procedures (611-CD-001-001).

#### **4.1.3.1.3 Schedule / Status at CST**

Operations CM entails control of ESDIS approved products introduced to the operational environment at or after the Release 2.0 Operations Readiness Review (ORR). Prior to ORR, CM of ECS products is administered by the ECS development organization.

#### **4.1.3.1.4 ECS M&O Responsibilities**

ECS GDAAC M&O will begin preparation to accept configuration management responsibility in advance of the ECS Release 2.0 ORR. They will review and approve baseline transfer plans in conjunction with the ECS Release 2.0 CCB and will engage in coordination sessions to define and implement actual transfer procedures. Plans to maintain an integrated ECS baseline that allows for controlled differences for site unique processes will be established.

The allocated responsibilities of the ECS CCBs are as follows:

**ESDIS**—Approves system product and establishment of operations baselines, interfaces to external systems, and DAAC unique extensions to ECS products and implements approved changes

**Science Systems PCMB**--Maintains all functional and performance requirements and SMC and DAAC interelement interfaces.

**Mission Systems PCMB**--Maintains all functional and performance requirements and FOS, EDOS, ETS, EPGS, and NISN interelement interfaces.

**SMC**—Monitors system operational configurations; controls SMC operations baseline; assesses and recommends changes to the ECS baseline

**EOC**—Assesses, recommends, and implements ESDIS approved changes to the EOC operations baseline

**DAACs**—Control non-ECS items, site-unique items, and site-specific modifications to ESDIS approved ECS products. Approve changes to the local facility. Implement site-specific modifications of ECS custom software when approved by ESDIS.

**SCFs (autonomous operations)**—Develop enhancements to and maintain science software that is a part of the DAAC ECS operations baseline .

#### **Configuration Management at Operational Sites**

ECS products deployed to the operational sites are software which is common to various operational sites. Common software that has been released for operational use is maintained in the M&O Software Library and maintained at each site (On-Site SDL). Site personnel maintain independent libraries for science software and other software not developed by ECS. Site personnel are responsible for any CM activities concerned with this library.

Each site maintains control over its site operational environment and products developed and/or delivered outside of the ECS project. Science software—which facilitates the ECS production of Standard Products—is developed by science investigators at the SCFs. Science software

developers are responsible for CM of their science software and for transferring all components of the software delivery package to the DAAC. Once the science software is delivered to the DAAC, it and its supporting documentation and data are placed under the custody of the local DAAC CM organization supported as needed by ECS local personnel. The Integration and Testing (I&T) of the science software at the DAAC is conducted by the DAAC management in coordination with the local ECS Project Science Software I&T team. Changes to science software during I&T are coordinated with the science software developer and, if necessary, other DAACs by the I&T team. Changes approved by the science software developer are incorporated in a CM-controlled environment. After acceptance, the revised science software package and all test data are transferred to the control of the local DAAC Manager. The process ensures that each DAAC controls their science software and that science software developers have full visibility into the process and results. Changes to science software having inter-DAAC dependencies will require coordination with the affected DAACs. The local DAAC CM organizations will ensure that coordination and agreement among the Science Systems PCMB and affected DAACs is completed before changed science software is moved into production.

#### **4.1.3.2 Computer Systems Preparation**

A detailed listing of the installed hardware and software baseline will be included in the management database, and the property management inventory report.

#### **4.1.3.3 Database Preparation**

Table 4-3, Release 2.0 System Databases, lists the database products integrated in ECS Release A, and the ECS subsystems and functions they support.

Table 4-4, Release 2.0 System Management Databases, and Table 4-5, Release 2.0 Production Databases, further define the full set of ECS databases that must be maintained. There is some redundancy among the tables due to the fact that some appear in more than one database.

These products will be installed after Release 2.0 CST as part of the ECS installation in preparation for acceptance testing at each site. They will be configured to meet testing environment needs.

The databases created for Acceptance Test will be used as the base for the operational databases. That is, databases will have been created, populated with schema and stored procedures, and containing test and reference data. After ORR, Configuration changes for certain operational databases must be performed by site ECS DAAC M&O personnel. Also, certain database tables will contain test data which must be removed or replaced by operational data. See Table 4-6, Preparing the Test Databases for Operation.

Configuration changes will be made by the Database Administrator with guidance from Software Development using tools provided with the DBMS. Where appropriate, pre-tested scripts will be provided by Software Development.

For databases created and maintained by COTS products, such as the Trouble Tickets database maintained using Remedy, M&O personnel, with support from Software Development, will use

the functionality provided by the COTS product to make necessary configuration changes and/or to delete or replace test data.

For custom ECS databases, such as the Ingest database maintained using DSS, M&O personnel, with support from the DBA and Software Development, will use the functionality provided by the relevant CSCI to make necessary configuration changes and/or to delete or replace test data. If delivered subsystem functionality does not include the needed functionality, Software Development will provide custom script(s) for this purpose.

**Table 4-3. Release 2.0 System Databases**

Database Product	ECS Subsystem	Supported Function	Supplementary COTS Package
Sybase	MSS	Management Data Access (MDA), Trouble Tickets, Accountability	Remedy
	CSS	ACL Database, Physical Network Management, Sybase logins	DCE, Mountainview, Sybase
	ICL	Ingest libraries	
	PLN, AIT		Autosys
	PLN, AIT	PDPS DB	
	ACM	Data Server	
	DRP		
	SPR	Processing	
	DMG	Data Management	
Illustra	DDS	Document Data Server	
Tivoli DB	MSS	Suite of Management Tools	Tivoli
Unify DB	MSS	MSS Baseline Manager	XRP II
DDTS DB	CSS	Discrepancy Reporting Tool	DDTS
ClearCase DB	CSS	Configuration Management Tool	ClearCase
Ingres	ICL	AMASS file Mgt. support	

**Table 4-4. Release 2.0 System Management Databases**

Application	Tool	Server	DBMS Used
Network Management	Hewlett Packard OpenView	MSS Server	Uses it's own flat files
System Performance Management	Tivoli TME/Sentry	MSS Server	Uses (proprietary) Sybase RDBMS
Extensible SNMP Agent	Peer Networks Optima	EDF/ALL	N/A
RDBMS	Sybase	MSS Server/All WS	N/A
Trouble Ticket Software	Remedy Corp. ARS	MSS Server	Uses Sybase RDBMS
Physical Configuration Management	Accugraph Corp. (PNM)	MSS Server	Sybase
Security/DCE Management	HAL DCE Cell Manager	MSS Server	N/A
Software Change Management	Atria Clearcase	MSS Server	Uses Raima DBMS
Change Request Management	Puresoft DDTS	MSS Server	Uses DDTS DBMS
Baseline Manager	HTG XRP	MSS Server	Uses Unify RDBMS

**Table 4-5. Release 2.0 Production Databases**

Database	Database Name	Description
Ingest DB	ingestops	
Ingest Mode Management testing DB	ingestts1	
Ingest Early Interface testing DB	ingestts2	
Ingest training	ingesttr1	
Advertiser DB	IoAdDatabase	
DMG DB	vOgateway	
MSS DB	MSS_DB_A	
CSS DB	EcsAclStorage	
PDPS DB	PDPS_DB	
Database for autosys	autosys	
User pull DB	DsStPullDisk	
Storage Management DB	DsStScheduler	
Data Server DB	DsMdMetadata	
Subscription DB	DbSbStore	

**Table 4-6: Preparing the Test Databases for Operation**

Database	Database Name	Preparation for Operation
Ingest DB	ingestops	None. Acceptance Test uses operational data.
Ingest Mode Management testing DB	ingestts1	None. Acceptance Test uses operational data.
Ingest Early Interface testing DB	ingestts2	None. Acceptance Test uses operational data.
Ingest training	ingesttr1	None. Acceptance Test uses operational data.
Advertiser DB	IoAdDatabase	
DMG DB	vOgateway	
MSS DB	MSS_DB_A	
CSS DB	EcsAclStorage	Delete “test” users and add “real” users with standard user authorization tools.
PDPS DB	PDPS_DB	Delete “test” data and reinitialize tables using a tool provided by development.
Database for autosys	autosys	
User pull DB	DsStPullDisk	
Storage Management DB	DsStScheduler	
Data Server DB	DsMdMetadata	
Subscription DB	DbSbStore	

#### **4.1.3.4 Operational Procedures Preparation**

##### **4.1.3.4.1 Purpose**

ECS Release 2.0 will be delivered with procedures and instructions for effective operation of the system. Operations procedures are defined as the step-by-step commands or on-line procedures needed to perform a function. The Operations Instructions are the off-line procedures or directives for performing administrative, operations, management or operations support activities, e.g., Configuration Management, Problem Management, Performance Reporting, etc. Each DAAC may modify these procedures and instructions to accommodate site-specific M&O requirements.

##### **4.1.3.4.2 Specification**

ECS Operational Procedures are documented in DID 611.

#### 4.1.3.4.3 Schedule/Status at CST

The initial ECS Release 2.0 procedures will be delivered prior to CST. An update to the initial delivery must be completed by each site before Release 2.0 turnover.

#### 4.1.3.4.4 ECS M&O Responsibilities

The delivered procedures will be used to support ECS Acceptance Testing by ECS M&O personnel as part of the AT Team. The ECS M&O staff will mark up the procedures in actual test operation to reflect desired changes. The mark ups will later be used by M&O personnel to create an update to the procedures after ORR and before the start of ECS ORE.

#### 4.1.3.5 Maintenance & Operations Staffing

##### 4.1.3.5.1 Purpose

ECS maintenance and operations organizations must recruit, hire, and schedule ECS M&O personnel to be ready to operate each site to the required level of performance commensurate with ECS operating plans and program milestones.

##### 4.1.3.5.2 Specification

ECS operations positions are identified and described in DID 607.

Staffing levels for each position are as required by local site management plans in response to ESDIS direction.

##### 4.1.3.5.3 Schedule / Status at CST

Staffing levels increase from beginning levels at CST to critical staffing at ORR and beyond. Current plans specify the shift operations indicated in Table 4-7, Shift Operations Requirements by Release 2.0 Milestone

**Table 4-7. Shift Operations by Release 2.0 Milestone**

Milestone	Location	Hours	Shifts
Testbed	GSFC DAAC	8 X 5	1
	GSFC SMC	-	-
ORR	GSFC DAAC	16X 5	2
	GSFC SMC	24X 5	3
AM-1	GSFC DAAC	24 X 5.5	3
	GSFC SMC	24 X 7	3

#### **4.1.3.5.4 ECS M&O Responsibilities**

Local site managers must provide staffing as required.

#### **4.1.3.6 Maintenance & Operations Training**

##### **4.1.3.6.1 Purpose**

Readiness for ECS Release 2.0 requires that M&O personnel be given training in the operation of the ECS and the COTS products that are integrated with the system. The ECS SEO will conduct classroom training in ECS operation. COTS training provisions have been made in M&O budgets for each operating location and must be applied as required by each site manager.

##### **4.1.3.6.2 Specification**

ECS Release 2.0 training plans are described in DID 622. ECS operations training course materials are provided in DID 626. ECS Certification Requirements are described in DID 626.

##### **4.1.3.6.3 Schedule / Status at CST**

ECS Release 2.0 training will be conducted at the Release 2.0 DAACs in the period between CST and ORR.

##### **4.1.3.6.4 ECS M&O Responsibilities**

Training will be conducted at the DAAC facilities. It is the responsibility of the local manager to arrange training facilities, schedule work schedules for trainees to allow class attendance without disruption, and make the ECS system available as required to support hands-on training periods.

#### **4.1.3.7 Logistics Systems Preparation**

##### **4.1.3.7.1 Purpose**

Logistics support plans provide for ECS maintenance and sparing of ECS sites in coordination with local site M&O personnel.

##### **4.1.3.7.2 Specification**

ECS logistics requirements specifications are provided in DID 613, Release 2.0 COTS Maintenance Plan.

The Release 2.0 COTS Maintenance Plan addresses the Release 2.0 maintenance concept and the responsibilities of the ECS Project for the commercial off-the-shelf hardware and software supplied by the ECS Contractor and government furnished equipment (GFE). The plan identifies the sources of maintenance support at ECS sites, periods of coverage, and responsibilities of the M&O staff and contracted maintenance providers. ECS sites included for maintenance support include GSFC, LaRC, NSIDC, EDC, and the EDF.



An overview of planned logistics provisions is provided below to present a complete summary of operational readiness actions in the period just before, and during, early system operations. The actual, specific logistics provisions found in updated, approved plans and procedures will supersede this overview.

#### **4.1.3.7.3 Schedule**

ECS COTS hardware and software is under vendor maintenance at ECS turnover when system operations commence.

Maintenance coverage during operations will sustain mission-critical operations. Generally, the principal period of maintenance (PPM) at the DAACs, EOC, SMC, and EDF will be 8AM to 5PM local, Monday through Friday, excluding local holidays.

Third-party maintenance providers and OEMs under maintenance subcontract have a 4 hour on-site response time after being notified of an equipment failure during the principal period of maintenance (PPM). Response for contracted maintenance support outside the PPM is provided on an as-required basis. If failures occur outside the PPM, the site should consider deferring OEM or maintenance subcontractor response until the next day if the malfunctioning system is not critical to ECS operations. This includes maintenance actions that would extend outside the PPM hours.

#### **4.1.3.7.4 ECS M&O Responsibilities**

Working under the general direction of the ECS M&O Manager, the ECS ILS Manager manages the ECS COTS maintenance program and other logistics operations. This includes the budget and expenditures associated with COTS Hardware and Software maintenance and the provisioning of spares in support of maintenance operations. The ILS Office (ILSO) assists ESDIS in the development of ECS COTS Hardware and Software maintenance policy; monitors and coordinates maintenance operations at the ECS sites; and manages maintenance support provided by vendors and OEMs.

Daily management and execution of DAAC, SMC, and EOC Hardware and Software maintenance is under the operational control of the DAAC, SMC, and EOC managers. Each site has a designated local maintenance coordinator (LMC) who executes maintenance support at the site, including problem diagnosis and isolation, maintenance support coordination, problem resolution, and recording COTS Hardware/Software maintenance actions performed at the site.

#### **Problem Resolution.**

The principal COTS Hardware and Software maintenance resource at the sites is the local maintenance coordinator (LMC), who also functions as the site's maintenance engineer. The LMC performs the initial fault diagnostics to isolate the cause of COTS Hardware and Software problems; determines the source of the maintenance support for the failed unit; and records the problem and its resolution into the management systems. The LMC may be the principal maintenance source for selected equipment having high  $A_o$  and or low MDT requirements. As a principal maintenance source, the LMC is responsible for isolating failures to the LRU and replacing it with an on-site spare. This self-maintenance approach provides faster maintenance

response than contracted maintenance support. The LMC is immediately available, understands the ECS architecture and operational requirements, and represents a lower cost maintenance approach for certain critical equipment.

The LMC is assisted by the site's system and network administrators to isolate and resolve problems. The DAAC's local help desk (for science user problems) and systems administrators (for operator problems) initiate the maintenance action by preparing a Trouble Ticket. The trouble Ticket is forwarded to the System Administrator to isolate the problem to one of the following:

- a. System configuration -- System administrator resolves
- b. Network configuration -- Network administrator resolves
- c. Custom software (i.e. ECS custom Software or science Software) -- Sustaining engineers resolve
- d. COTS Software -- LMC and sustaining engineers resolve with Software vendor support
- e. COTS Hardware -- LMC resolves with OEM or maintenance subcontractor support

Trouble Tickets are monitored until problems are resolved and their resolution verified. Once verified, the system administrator or the LMC closes the Trouble Tickets and updates the Baseline Manager (if a change to the configuration baseline was required). Changes to custom Software are accomplished by ECS sustaining engineers using the Software configuration management system (i.e. ClearCase) following the ECS Software CM Plan and procedures described in Project Instruction 193-103-MG3-001, Configuration Management Procedures for the ECS Project.

The LMC coordinates resolution of COTS Hardware and Software maintenance actions. If problems cannot be corrected using site or contracted maintenance support resources, the LMC can escalate the problem to the SMC or the ILS Maintenance Coordinator

### **SMC Support.**

The SMC provides support for developed application Software, network, and design problems and monitors Trouble Tickets logged by the sites. Using the Trouble Ticketing system to recall similar problems, the SMC can assist the sites in problem diagnosis/resolution through reviewing previous configuration changes and problems reported against the equipment and subsystems. The SMC can also review similar problems experienced at other DAACs to identify possible causes and offer corrective actions.

### **Spares Provisioning.**

Spare parts may be provisioned at the sites to ensure replacement COTS LRUs are available to effect the immediate repair of failed critical equipment. These sparing determinations are documented in the Replacement and Spare Parts List (DID 618). Spares provisioning levels may be adjusted after sufficient failure data is gathered during ECS operations to warrant adjusting site spares quantities and types. Spares used at the sites are reported to the ILS Maintenance

Coordinator, who will replenish site stocks, as needed. The use and replenishment of site spares is monitored by the ILS Maintenance Coordinator.

## **4.2 GSFC DAAC Operational Readiness Exercises (ORE)**

### **4.2.1 Introduction**

This section describes the GSFC DAAC participation in a hierarchy of system readiness verification at the various levels of the ECS Release 2.0 system:

- DAAC Functionality and Interfaces
- ECS System Functionality and Internal Interfaces
- ECS External Interfaces

The hierarchy begins with each DAAC verifying internal readiness, expands to inter-DAAC, and DAAC to EOS connectivity, and then to ECS system network readiness verification, and concludes with verification of operability of ECS system connectivity to external systems. The readiness verification activity culminates in an Operational Readiness Review which declares the ECS ready to support system operations.

Many of the Rel 2.0 OR exercises reuse procedures from acceptance testing. They are identified by name and description in this section to explain their application as operational readiness exercises. Refer to the acceptance test procedures document (DID 411) for more detail and the actual procedure.

### **4.2.2 GSFC DAAC Operational Readiness Exercises**

#### **4.2.2.1 Verification of System Status**

This exercise of Acceptance Test Procedure sequences (8.3.1) verifies ECS can be powered up using normal cold-start procedures, operated and shutdown using normal shutdown procedures. The ECS is subsequently restarted to verify the system's ability to perform normal "warm restart" procedures.

<b>Site Startup Confidence Test</b> <b>ATO Test Procedure No.: A080110.040\$G</b>	The purpose of this test is to demonstrate a normal startup, operations and shutdown of the ECS site.
<b>ECS Hardware and Software Configuration Items Review</b> <b>ATO Test Procedure No.: A080110.020\$G</b>	This test verifies the ECS hardware and software configuration items are present and properly integrated into the system.

#### **4.2.2.2 Verification of Communications Status**

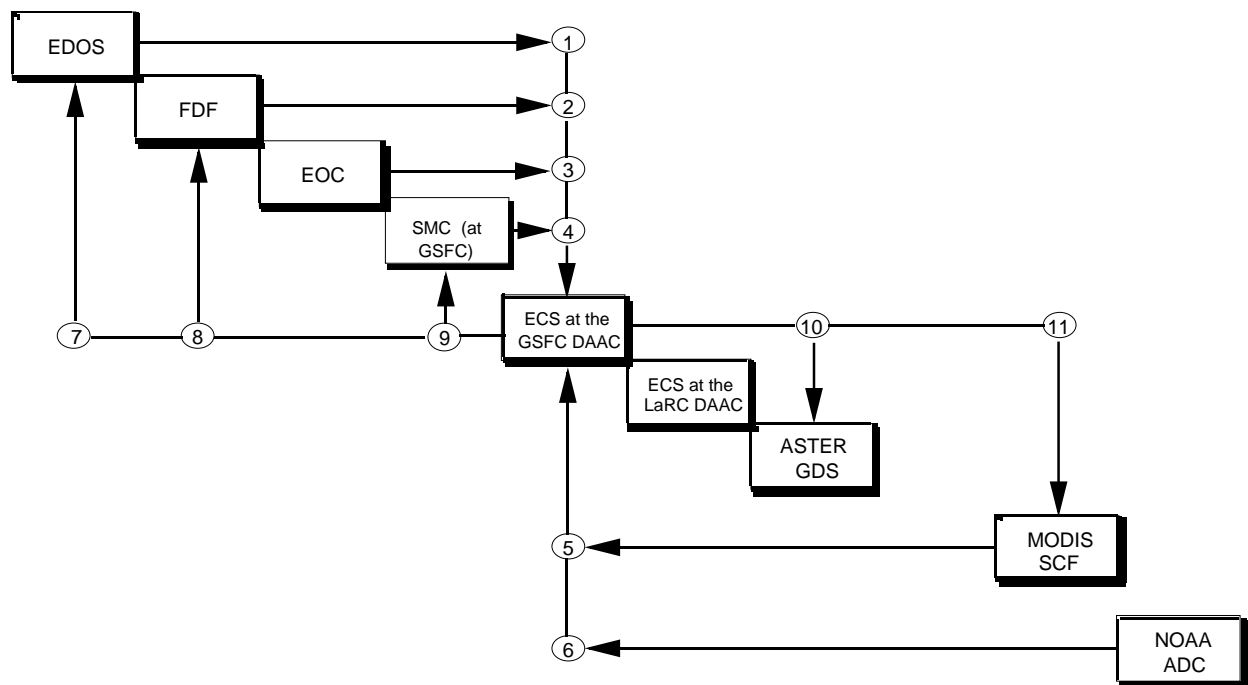
This exercise of Acceptance Test Procedure sequences (12.1.1) verify the capability of the users/operators at each DAAC to receive and handle broadcast messages. Users/operators at each DAAC broadcast messages to the other DAACs and the SMC and receive message receipt

acknowledgments. Message traffic to/from the EOC and the GSFC DAAC and the SMC is also verified.

<b>Inter-DAAC and DAAC-SMC Communications</b> <b>ATO TEST Procedure No.: A120110.020\$G</b>	This procedure tests the capability of the GSFC DAAC ECS to sequentially send messages to the other Release A DAACs and to the SMC. The GSFC DAAC also sends messages to the EOC. The capability of the GSFC DAAC ECS to receive and process acknowledgments of message receipt is also verified. In addition, the EOC and the SMC send messages to the GSFC DAAC and receive acknowledgments of message receipt in return.
<b>Network Configuration and Status</b> <b>ATO Test Procedure No.: A080490.010\$G</b>	The Network Status Test confirms the ability of the GSFC LSM staff to obtain configuration management information and the status of network resources, including data flow status information. Services provided by ECS include collecting information describing the state of the network subsystem and its communications resources. This test also verifies the ability to perform management functions which exercise control over the network configuration, parameters, and resources. These functions include access to and manipulation of network resources.

#### **4.2.2.3 Verification of External I/F Status**

Figure 4-2. GSFC Interface Nodes, is a graphical representation of the interfaces between EGS sites associated with the GSFC DAAC. A summary of the content and carriers associated with the data flowing across GSFC ECS interfaces is shown in Table 4-8.



**Figure 4-2. GSFC Interface Nodes**

**Table 4-8. GSFC ECS Release 2.0 Data Flow Interfaces (1 of 2)**

Node	Mission	Source	Destination	Carrier /Media	Data Content
1	AM-1	EDOS	ECS at the GSFC DAAC	EBnet	Service Request Disposition; PDSs (Level-0 data); ADSs (Back-up Level-0 Data); PDS and ADS Delivery Records; Physical Media Unit Delivery Record; Undetected Fault Isolation.
2	AM-1	FDF	ECS at the GSFC DAAC	NOLAN	Repaired Orbit Data.
3	AM-1	EOC	ECS at the GSFC DAAC		Telemetry Data; Event; EOC statistics, schedules, reports, etc.

**Table 4-8. GSFC ECS Release 2.0 Data Flow Interfaces (2 of 2)**

Node	Mission	Source	Destination	Carrier /Media	Data Content
4	AM-1	SMC at GSFC	ECS at the GSFC DAAC		Policies; Conflict Resolution; Procedures; Directives.
5	AM-1	MODIS SCF	ECS at the GSFC DAAC	NSI	Algorithms; Remote Access Session Dialog; Request for Operational Data Production Software Package; Request for Test Products after Software Integration and Test; Test Product Reviews; QA Notification Specification; QA Metadata Updates; Request for Processing Status; Request for Resource Usage; Reprocessing Requests.
6	AM-1	NOAA ADC	ECS at the GSFC DAAC	NSI	Advertising Information; Dependent Valid Update; Inventory Search Result; Integrated Browse Result; FTP Browse Result; Product Result Message; Guide Result; NCEP Ancillary data.
7	AM-1	ECS at the GSFC DAAC	EDOS	EBnet	Service Requests (Back-up data requests); Fault report; Fault Isolation Request; Level-0 data.
8	AM-1	ECS at the GSFC DAAC	FDF	NOLAN	Repaired/Retained Orbit Data Request and attitude data.
9	AM-1	ECS at the GSFC DAAC	SMC at GSFC		Conflict Resolution Request; Status; Performance.
10	AM-1	ECS at the GSFC DAAC	ASTER GDS	NSI	ASTER Level 0 Expedited Data
11	AM-1	ECS at the GSFC DAAC	MODIS SCF	NSI	ECS Software Package; I & T Requirements; Science Software Integration Test Status; Data Availability notices; Operational Science Data Production Software Package; Test Product Availability Message during Software I & T; QA Notification Specification Acknowledgment; Data Quality Request Notification; Data Delivered for QA; Processing Status; Resource usage; Reprocessing Request Acknowledgment; Product history.

#### GSFC DAAC Interface Exercises

The primary purpose of this exercise sequence is to assure that the staff can access M&O services, via appropriate interfaces, allowing them to select the correct M&O interface to ECS subsystems from local and remote terminals. This sequence verifies the basic connectivity and

fundamental protocols for GSFC ECS DAAC external and internal interfaces in support of Release 2.0 operations.

<b>DAAC M&amp;O Interfaces</b> <b>ATO Test Procedure No.: A080160.010\$G</b>	<p>Demonstrates that M&amp;O interfaces, provided for GSFC DAAC ECS subsystems are accessible and functioning and that these interfaces are sufficient to support planned operations and maintenance activities. Demonstrate that the M&amp;O interface provides access to on-line services for Accountability, Fault Management, Performance Management, and Report Generation. Demonstrates that other on-line services are available for three aspects of security management network, communications and host processors along with general message exchange services to support E-mail, FTP file access, Bulletin Board, and Virtual Terminal capabilities.</p> <p>Demonstrates that the M&amp;O interface provides access to off-line configuration control services to support Baseline Management, Software Change Management, Change Request Management, Software Distribution Management, and Software License Management, Demonstrates that the M&amp;O interface provides access to off-line resource management services to support Inventory management, Logistics management, Training and Policies &amp; Procedures management using Office Automation tools.</p>
<b>GSFC DAAC External Interfaces</b> <b>ATO Test Procedure No.: A080180.050\$G</b>	<p>This test case verifies GSFC ECS DAAC connectivity with ECS external systems using the File Transfer Protocol.</p>
<b>ECS Internal Interfaces</b> <b>ATO Test Procedure No.: A080180.090\$G</b>	<p>This test case verifies the capability for the GSFC DAAC to communicate with the LaRC, EDC, SMC and EOC.</p>

The Acceptance Test Procedure Early FDF and AM-1 Interface Test Support Sequences verify that the GSFC DAAC supports the early interface testing of the AM-1 launch.

<b>AM-1 Data Ingest from EDOS at the GSFC DAAC</b> <b>ATO Test Procedure No.: A090130.020\$G</b>	<p>The purpose of this test is to verify that the GSFC DAAC ingests MODIS Level 0 data products from EDOS. This procedure confirms that the GSFC DAAC ingests, accounts for, and temporarily archives the AM-1 Level 0 data products.</p>
<b>Orbit/Attitude Data Ingest from FDF</b> <b>ATO Test Procedure No.: A090140.010\$G</b>	<p>The purpose of this test is to verify that the GSFC DAAC ingests data from the FDF. This procedure confirms that the GSFC DAAC ingests, accounts for, and archives the FDF data.</p>

The Acceptance Test Procedure GSFC SCF/ECS sequence (10.2.1) verifies that ECS is accessible to a user at the MODIS SCF. The MODIS SCF is concerned with the data that is processed by the GSFC DAAC.

<b>Algorithm Integration and Test at the GSFC DAAC</b> <b>ATO Test Procedure No.: A100230.010\$G</b>	This procedure tests the GSFC DAAC's Science Software Integration and Test Team's (SSITT) ability to install, verify, archive, and report on science software ingested from the MODIS SCF. Next, it verifies the user interfaces between the ECS DAAC and the MODIS SCF supports continued testing and development of science algorithms. Finally, this test verifies the MODIS SCF's ability to search, retrieve, and check-out data and algorithms from the DAAC archive.
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### 4.2.3 GSFC DAAC Participation in ECS Readiness Exercise

ECS Operational Readiness Exercises (ORE) will be conducted to determine the readiness of each ECS element to provide services. The GSFC DAAC will participate in system-level exercises to verify that communications and user data services operate across individual site boundaries. The ECS system-level ORE will be conducted under the coordination of a test director, to verify that the functional capabilities of ECS Release 2.0 are ready to support operations. The ORE will concentrate on operational procedures, human interfaces, and operational M&O databases.

#### 4.2.3.1 GSFC DAAC Verification

This exercise of Acceptance Test Procedure sequences (12.5.4) verifies the ECS's capability to support testing in all phases in the development and mission life cycle and verifies broad overall functional capabilities.

<b>ECS Overall Capabilities</b> <b>ATO Test Procedure No.: A120640.030\$G</b>	The ECS Overall Capabilities procedure consolidates requirements that specify broad ECS capabilities. These requirements are too broad to be verified through the execution of a single test or demonstration. In this procedure, the results of previously executed procedures are reviewed and analyzed to verify that the ECS is capable of performing all Release 2.0 functionality.
<b>Test Support in an Operational DAAC</b> <b>ATO Test Procedure No.: A120640.010\$G</b>	The Test Support in an Operational DAAC test verifies the site's DAAC capabilities to support end-to-end test activities including system testing of the interfaces between ECS and the AM-1 Project. These activities must be accommodated without impacting DAAC operations.



### **4.3 GSFC DAAC Participation in ECS ORR**

The ECS Release 2.0 Operational Readiness Review (ORR) will be conducted to determine the readiness of each ECS element to provide operational services. The review will be conducted in a distributed manner, via OPSTELE, with DAAC, SMC, and EOC personal at their own facilities, under the coordination of a test director/chairperson at the SMC. The ORR will concentrate on confirming the operational readiness of hardware and software, operational procedures, human interfaces, and operational M&O database readiness.

## 5. ECS SMC Release 2.0 Operational Readiness

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SMC Release 2.0 functions are provided by ECS subsystems to achieve mission and operations functionality for Release 2.0. Key ECS related mission and operations activities supported by the SMC include:

Activity	ECS Subsystem
• User Registration	Communications Subsystem
• System Performance Analysis	Systems Management Subsystem
• Security Management Analysis	Systems Management Subsystem
• Fault Management Analysis	Systems Management Subsystem
• Accountability, Accounting & Billing	Systems Management Subsystem
• Configuration Management	Systems Management Subsystem
• ECS Policy Dissemination	Systems Management Subsystem Communication Subsystem

This operational readiness plan identifies the activities and events that will occur at the SMC as part of the ECS Release 2.0 system turnover, and the necessary support that M&O personnel must provide to support the turnover activities. Further, the plan identifies the actions required of M&O to prepare the turned over system for actual user operations, and to verify that it is ready to commence such operation.

### 5.1 Prerequisites to SMC ORE and ORR

The ECS Release 2.0 Master Schedule includes a number of significant events occurring prior to, and prerequisite to, the beginning of system maintenance and operations activities. All Release 2.0 organizations will be affected to some extent, and must therefore have a role in supporting, these events.

This section identifies the major ECS Release 2.0 SMC activities and events which must be successfully completed prior to M&O exercises to determine readiness to perform system operations.

#### 5.1.1 ECS Release 2.0 System Turnover Activities

The ECS Release 2.0 delivery for the start of site M&O activities occurs at the Release Readiness Review. At this point the system transitions from the development and test phase to the maintenance and operations phase. Prior to that transition, M&O emphasis will be on support for the integration and test of the system.

An SMC Activity Schedule, will be derived to show scheduled ECS Release 2.0 turnover activities planned at SMC that include AM-1 system integration of EBNet, DAACs, EOC, and AM-1 Project. Each turnover event, and its required site support, are addressed in the subsections that follow.

### **5.1.1.1 ECS Release 2.0 Acceptance Testing**

The complete set of ECS functions allocated to Release 2.0 for the SMC are verified to ensure that the release meets those requirements needed to support AM-1 mission operations. This includes verifying requirements for all features needed to support the ECS Release objectives for scheduling, data operations, information management and archive, science processing, networks, and system management.

#### **5.1.1.1.1 Purpose**

Acceptance tests include the verification of ECS features needed to support AM-1. Acceptance tests also include the early verification of interfaces needed to support AM-1.

#### **5.1.1.1.2 Event Schedule**

Acceptance testing begins after a successful Custom Software Turnover (CST). Prior to CST, walk-throughs of the entire Acceptance Test Procedure (DID 411) are conducted at the EDF to ensure proper format, contents, and completeness of the test scenarios and test plan. Additionally, concurrent with the execution of I&T, critical acceptance test sequences and test cases are executed by ATO against the I&T baseline to ensure that any major problems with either the Release, or the Acceptance Test Procedures and resources, are found at the EDF where they can be most easily corrected. Differences in the test environments between the EDF and the sites(s) are considered by the ATO to account for potential differences in expected test results. Discrepancies observed during acceptance test preparations are formally filed as NCRs and dispositioned.

Two phases of acceptance testing are executed at specified sites. These phases are: site-specific testing, where the focus is on each individual site; and "all up" testing, where the sites and elements are tested simultaneously as a system. In each case, the final scenario to be executed is an acceptance test demonstration, which exercises a comprehensive sequence of events verifying the overall site-specific and ECS-wide capabilities of the Release. Details concerning the test environment and procedures to be followed at test sites are described in the Acceptance Test Procedures (DID 411).

As the acceptance testing proceeds from site to site, discrepancies may be uncovered which were not observed during tests at previous sites. If the mitigation of these discrepancies requires the generation of a new Release version, retesting of the new version at each site is the first order of business during the all-up ECS acceptance test.

SMC ECS Release 2.0 acceptance testing will be conducted during the two month period following the Release 2.0 CST.

A detailed schedule will be coordinated with each site, to minimize disruption to ongoing operations. The final schedule will include dates, times and duration for all formal acceptance testing that occurs at the site.

#### **5.1.1.1.3 M&O Roles and Responsibilities**

The site manager will assign M&O personnel who will be integrated into the test team to help execute acceptance tests. The early first-hand involvement of the site manager and his operations personnel in site acceptance testing provides the M&O Team with early visibility into each new release and hastens a smooth transition. This involvement and familiarity with ECS software in the stages before release to the user base greatly enhance the effectiveness and productivity of the M&O staff and positions a highly competent and responsive user support staff on-site at the sites. In addition, during the M&O phase, the ATO assists by providing benchmark tests to verify operational performance of the ECS system. The ATO provides acceptance testing procedures for use during the verification of approved changes and enhancements.

#### **5.1.1.1.4 Resource Requirements**

##### **5.1.1.1.4.1 Personnel**

The ATO requests that M&O personnel be designated as part of the test team for the duration of the test period. That will require people from positions at the SMC. Two shift operations are required to complete all planned AT procedures as introduced in Table 5-1, ATO M&O Personnel Requirements.

***Table 5-1. ATO M&O Personnel Requirements***

<b>Location</b>	<b>Positions</b>
<b>SMC</b>	System Administrator Database Administrator CM Specialist

##### **5.1.1.1.4.2 Office Resources**

The AT Team will send up to 27 people to SMC in the role of AT Lead and AT team members during the AT period. They will require appropriate desk space, telephone, computers with office automation tools, FAX, and copier provision. Use of a conference room or designated work space with tables in the computer room is requested.

##### **5.1.1.1.4.3 System Access**

The AT Team will require complete, dedicated ECS System access during the AT period. Any other system access during this time will require the written approval of the ECS Release 2.0 CCB and the AT Team Leader.

##### **5.1.1.1.4.4 Test Databases**

The AT plan requires that a limited amount of V0 data, and simulated AM-1 data be available for test operations. The AT Team will provide all required test data.

#### **5.1.1.1.4.5 Other Requirements**

Badging and security registration is required to allow test team visitors campus, building, and restricted room access.

### **5.1.2 EGS Integration and Test**

As part of the Certification Test development process it will be necessary to identify all essential operational activities which occur during a day, at the SMC. This will include all operational activities along with the frequency and times of occurrence during a day. The Timeline Charts will be used as a master reference to develop the “3 Days in the Life” Certification Test scope, and will be cross-referenced to test packages and SMC operations procedures which verify the activities.

#### **5.1.2.1 Purpose**

The EGS certification will verify the capabilities to support the functions to support the AM-1 mission.

The EGS is supported by:

- EOS Data Information System (EOSDIS) Core System (ECS) Release 2.0.
- EOS Data and Operations System (EDOS) Versions 2 and later 3, and
- EOSDIS Backbone Network (EBnet) phase A.

NASA Institutional elements required to support this testing are: Sensor data Processing Facility (SDPF), the NASA Science Internet (NSI), the Space Network (SN), the Deep Space Network (DSN), NASA Communications Nascom), Ground Network (GN), Wallops Orbital Tracking Station (WOTS), and the Flight Dynamics Facility (FDF).

The EGS I&T Program consists of two main efforts: 1) the Confidence Test Program, and 2) the Flight Projects Joint Testing Program.

The Confidence Test Program focuses on demonstrations of key functionality and mission critical requirements, and emphasizes operability. The objective of the overall EGS I&T Program is to demonstrate and certify EGS Mission Readiness as a precursor to Operations Readiness Testing conducted by the Mission Operations Manager and Science Operations Manager. A continuously evolving set of confidence test packages is maintained at the EGS Component, EGS Interface, and EGS System levels. The EGS I&T team leads the development and execution of individual confidence test packages. Confidence test packages include test procedures, test data, and other supporting material, and are designed to exercise the system in its final form.

### 5.1.2.2 Events Schedule

A detailed EGS Science System and Operations Certification planning and preparation schedule needs to be developed after review and revision of this preliminary set of milestones<sup>6</sup>.

$\Delta_1$  --complete certification timeline definition (per DAAC) for launch version EGS system

$\Delta_2$ – list definition of individual EGS system level certifications tests on a DAAC by DAAC basis, cross-referenced to timeline

$\Delta_3$ – list definition of DAAC specific Operations Procedures, cross-referenced to EGS system level timeline for each DAAC

$\Delta_4$ – complete draft of individual EGS system level certification tests on a DAAC by DAAC basis (TBDs defined for capabilities-requirements test scope, work-arounds, test data)

$\Delta_5$ – Definition of individual DAAC EGS System level Qualification Tests (more detailed than Cert tests; defined prerequisites to cert. Tests)

$\Delta_6$ – 60-day maturity level (i.e. 60 days before test) individual EGS system level certifications tests on a DAAC by DAAC basis (detailed procedures – open TBDs are counted as liens against the test packages) These procedures are dry-run and redlined within 30 days.

$\Delta_7$ – 45-day maturity level individual DAAC EGS System level Qualification Tests (detailed procedures – open TBDs are counted as liens against the test packages) These procedures are dry-run and redlined within 45 days.

$\Delta_8$ – 60-day maturity level individual DAAC EGS System level Operations Procedures Qualification Tests (detailed procedures – open TBDs are counted as liens against the ops procedures. These procedures are dry-run and redlined within 30 days.

$\Delta_9$ – 30-day maturity level individual EGS system level Certification tests on a DAAC by DAAC basis (detailed procedures – open TBDs are counted as liens against the test packages) These procedures are dry-run and redlined within 30 days.

$\Delta_{10}$  – execute individual DAAC EGS System level Qualification Tests (collect formal results, issue DRs/NCRs). Regression test as required.

$\Delta_{11}$  – execute individual DAAC EGS System level Operations Procedures Qualification Tests (collect formal results, issue DRs/NCRs). Modify procedures as required.

$\Delta_{12}$  – execute individual EGS system level Certification tests on a DAAC by DAAC basis. (collect formal results, issue DRs/NCRs). Regression test as required. Followed by formal certification assessment report to project; results referenced for ORR,

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<sup>6</sup> The milestone dates are based on the formal ESDIS schedule distributed at the October 23, 1997 DAAC Managers meeting. The maturity milestones reflect a system level Qualification test start date of March 3, 1998, and a Science System and Operations Certification start date of April 15, 1998. Subject to change.

$\Delta_{13}$  – execute individual DAAC EGS System level Operations Procedures Qualification Tests (collect formal results, issue DRs/NCRs). Modify procedures as required. Followed by formal certification assessment report to project; results referenced for ORR.

### 5.1.2.3 M&O Roles and Responsibilities

The EGS I&T Team requests that M&O personnel be designated as part of the test team for the duration of the test period. That will require people from positions at each DAAC and at the SMC. One shift operation is required to complete all planned EGS I&T procedures.

### 5.1.2.4 Resource Requirements

#### 5.1.2.4.1 Personnel

EGS I&T requests support from the people/positions as shown in Table 5-2, M&O Personnel Support to EGS I&T, during their activity period at each site.

**Table 5-2. M&O Personnel Support to EGS-1 I&T**

Location	Positions
SMC	System Administrator Database Administrator CM Specialist

#### 5.1.2.4.2 Office Resources

The EGS-1 I&T Team will send people to each site in the role of Test Conductor and team members. They will require appropriate desk space, telephone, computer with office automation tools, FAX, and copier provision.

#### 5.1.2.4.3 System Access

Dedicated ECS system access is required for the entire period of scheduled I&T activity.

User accounts for the test team will be established by ECS Release 2.0 M&O personnel.

#### 5.1.2.4.4 Test Databases

The EGS I&T Plan requires that selected simulated AM-1 data be available for test operations.

Provision of test data is the responsibility of the EGS-1 I&T Team. They will reuse test databases created for ECS Acceptance Testing and TRMM simulations.

#### 5.1.2.4.5 Other Requirements

Badging and security registration is required to allow test team visitors campus, building, and restricted room access.

### **5.1.3 ECS SMC Release 2.0 Preparation**

#### **5.1.3.1 Configuration Management**

##### **5.1.3.1.1 Purpose**

The objective of Release 2.0 ECS CM activities is to control the baseline configuration of ECS hardware, software, and firmware components deployed to the sites; control changes to these components and associated documentation; and record and report information concerning approved baseline resources changes.

ECS Sustaining Engineering Organization CM activities commence with a hand-off from the Acceptance Test Organization (ATO) at the turnover following formal Physical Configuration Audit (PCA) and Functional Configuration Audit (FCA) of the ECS delivered product. This configuration baseline and any associated liens are recorded in the Version Description Document (VDD).

There are multiple levels of configuration management within the ECS Project. The SMC-level CCB interacts with the Science Systems Program Configuration Management Board (PCMB). The PCMB and the ECS Development CCB interacts directly with the ESDIS CCB. The ECS Release 2.0 CCB manages installation and changes at each location prior to turnover under the governance of the ECS Development CCB and, as necessary, the ESDIS and host center CCBs. The ECS M&O organization at each center supports the host organization CCB. In accordance with the ESDIS Configuration Management Plan, GSFC #423-10-21, and the ESDIS Distributed Active Archive Center (DAAC) Strategic/Management Plan, the ESDIS CCB provides configuration control over all ECS developed CIs.

##### **5.1.3.1.2 Specification**

ECS Configuration Management requirements are provided in the ESDIS CM Plan, Maintenance and Operations Configuration Management Plan for the ECS Project (102-CD-002-001), and the section 9 CM Procedures of the M&O Operations Procedures (611-CD-001-001).

##### **5.1.3.1.3 Schedule/Status at CST**

Operations CM entails control of ESDIS approved products introduced to the operational environment at or after the Release 2.0 Operations Readiness Review (ORR). Prior to ORR, CM of ECS products is administered by the ECS development organization.

##### **5.1.3.1.4 ECS M&O Responsibilities**

ECS SMC M&O will begin preparation to accept configuration management responsibility in advance of the ECS Release 2.0 ORR. They will review and approve baseline transfer plans in conjunction with the ECS Release 2.0 CCB and will engage in coordination sessions to define and implement actual transfer procedures. Plans to maintain an integrated ECS baseline that allows for controlled differences for site unique processes will be established.



The allocated responsibilities of the ECS CCBs are as follows:

**ESDIS**—Approves system product and establishment of operations baselines, interfaces to external systems, and DAAC unique extensions to ECS products and implements approved changes

**Science Systems PCMB**--Maintains all functional and performance requirements and SMC and DAAC interelement interfaces.

**Mission Systems PCMB**--Maintains all functional and performance requirements and FOS, EDOS, ETS, EPGS, and NISN interelement interfaces.

**SMC**—Monitors system operational configurations; controls SMC operations baseline; assesses and recommends changes to the ECS baseline

**EOC**—Assesses, recommends, and implements ESDIS approved changes to the EOC operations baseline

**DAACs**—Control non-ECS items, site-unique items, and site-specific modifications to ESDIS approved ECS products. Approve changes to the local facility. Implement site-specific modifications of ECS custom software when approved by ESDIS.

**SCFs (autonomous operations)**—Develop enhancements to and maintain science software that is a part of the DAAC ECS operations baseline .

#### Configuration Management at Operational Sites

ECS products deployed to the operational sites are software which is common to various operational sites. Common software that has been released for operational use is maintained in the M&O Software Library and maintained at each site (On-Site SDL). Site personnel maintain independent libraries for science software and other software not developed by ECS. Site personnel are responsible for any CM activities concerned with this library.

Each site maintains control over its site operational environment and products developed and/or delivered outside of the ECS project. Science software—which facilitates the ECS production of Standard Products—is developed by science investigators at the SCFs. Science software developers are responsible for CM of their science software and for transferring all components of the software delivery package to the DAAC. Once the science software is delivered to the DAAC, it and its supporting documentation and data are placed under the custody of the local DAAC CM organization supported as needed by ECS local personnel. The Integration and Testing (I&T) of the science software at the DAAC is conducted by the DAAC management in coordination with the local ECS Project Science Software I&T team. Changes to science software during I&T are coordinated with the science software developer and, if necessary, other DAACs by the I&T team. Changes approved by the science software developer are incorporated in a CM-controlled environment. After acceptance, the revised science software package and all test data are transferred to the control of the local DAAC Manager. The process ensures that each DAAC controls their science software and that science software developers have full visibility into the process and results. Changes to science software having inter-DAAC dependencies will require coordination with the affected DAACs. The local DAAC CM organizations will ensure

that coordination and agreement among the Science Systems PCMB and affected DAACs is completed before changed science software is moved into production. The SMC will monitor all change activity from a central database.

### 5.1.3.2 Computer Systems Preparation

SMC System Hardware, Software Configuration for Release 2.0, is specified in the DID 305 specification.

Table 5-3, shows the SMC support staff hardware mapping that must be in place by ORR.

**Table 5-3. SMC Support Staff Hardware Mapping**

Site	Staff	Equipment / Type	Env.	ECS Network Subnet
SMC	SMC Supervisor	Macintosh Power Mac 7200/75 w/ 17" monitor	Mgt.	Operations LAN
SMC	Performance Analyst	Sparc 20/71	SE	Operations LAN, FDDI
SMC	Configuration Mgt.	Sparc 20/71	SE	Operations LAN, FDDI
SMC	Network Analyst	X Terminal	SE	Operations LAN
SMC	System Administration	X Terminal	SE	Operations LAN
SMC	Accountant	PC	SE	Operations LAN
SMC	Hardware Maintenance	X Terminal	SE	M&O LAN
SMC	Fault Manager	Sparc 20/71	SE	Operations LAN, FDDI
SMC	Security Controller	Sparc 20/71		Operations LAN, FDDI
SMC	USWG Liaison	X Terminal	SE	Operations LAN
SMC	Computer Operator	X Terminal	SE	Operations LAN, FDDI
SMC	Resource Controller	HP 715/64	SE	M&O LAN

### 5.1.3.3 Database Preparation

Listed below in Table 5-4, SMC Release 2.0 System Databases, are the databases at the SMC supported in Release 2.0. All databases must be in place and populated by ORR.

**Table 5-4. SMC Release A System Databases**

Application	Tool	Server	DBMS Used
Network Management	Hewlett Packard OpenView	MSS Server	Uses it's own flat files
System Performance Management	Tivoli TME/Sentry	MSS Server	Uses (proprietary) Sybase RDBMS
Extensible SNMP Agent	Peer Networks Optima	EDF/ALL	N/A
RDBMS	Sybase	MSS Server/All WS	N/A
Trouble Ticket Software	Remedy Corp. ARS	MSS Server	Uses Sybase RDBMS
Physical Configuration Management	Accugraph Corp. (PNM)	MSS Server	Sybase
Security/DCE Management	HAL DCE Cell Manager	MSS Server	N/A
Software Change Management	Atria Clearcase	MSS Server	Uses Raima DBMS
Change Request Management	Puresoft DDTS	MSS Server	Uses DDTS DBMS
Baseline Manager & Inventory Logistics Manager	HTG XRP	MSS Server	Uses Unify RDBMS

#### **5.1.3.4 Operation Procedures Preparation**

##### **5.1.3.4.1 Purpose**

ECS Release 2.0 will be delivered with procedures and instructions for effective operation of the system. Operations procedures are defined as the step-by-step commands or on-line procedures needed to perform a function. The Operations Instructions are the off-line procedures or directives for performing administrative, operations, management or operations support activities, e.g., Configuration Management, Problem Management, Performance Reporting, etc. Each site may modify these procedures and instructions to accommodate site-specific M&O requirements.

##### **5.1.3.4.2 Specification**

ECS Operational Procedures are documented in DID 611.

##### **5.1.3.4.3 Schedule**

The initial ECS Release 2.0 procedures will be delivered prior to CST. An update to the initial delivery must be completed by each site before Release 2.0 turnover.

#### 5.1.3.4.4 ECS M&O Responsibilities

The delivered procedures will be used to support ECS Acceptance Testing by ECS M&O personnel as part of the AT Team. The ECS M&O staff will mark up the procedures in actual test operation to reflect desired changes. The mark ups will later be used by M&O personnel to create an update to the procedures after ORR and before the start of ECS ORE.

#### 5.1.3.5 Maintenance & Operations Staffing

##### 5.1.3.5.1 Purpose

ECS maintenance and operations organizations must recruit, hire, and schedule ECS M&O personnel to be ready to operate each site to the required level of performance commensurate with ECS operating plans and program milestones.

##### 5.1.3.5.2 Specification

ECS operations positions are identified and described in DID 607.

Staffing levels for each position are as required by local site management plans in response to ESDIS direction.

##### 5.1.3.5.3 Schedule/ Status at CST

Staffing levels increase from beginning levels at CST to full staffing at ORR and beyond. Current plans specify the shift operations indicated in Table 5-5, Shift Operations Requirements by Release 2.0 Milestone

**Table 5-5. Shift Operations by Release 2.0 Milestone**

Milestone	Location	Hours	Shifts
Testbed	GSFC DAAC	8 X 5	1
	GSFC SMC	-	-
ORR	GSFC DAAC	16X 5	2
	GSFC SMC	24X 5	3
AM-1	GSFC DAAC	24 X 5.5	3
	GSFC SMC	24 X 7	3

##### 5.1.3.5.4 ECS M&O Responsibilities

Local site managers must provide staffing as required.

### **5.1.3.6 Maintenance & Operations Training**

#### **5.1.3.6.1 Purpose**

Readiness for ECS Release 2.0 requires that M&O personnel be given training in the operation of the ECS and the COTS products that are integrated with the system. The ECS SEO will conduct classroom training in ECS operation. COTS training provisions have been made in M&O budgets for each operating location and must be applied as required by each site manager.

#### **5.1.3.6.2 Specification**

ECS Release 2.0 training plans are described in DID 622. ECS operations training course materials are provided in DID 626. ECS Certification Requirements are described in DID 626.

#### **5.1.3.6.3 Schedule / Status at CST**

ECS Release 2.0 training will be conducted at the Release 2.0 SMC in the period between CST and ORR.

#### **5.1.3.6.4 ECS M&O Responsibilities**

Training will be conducted at the SMC facilities. It is the responsibility of the local manager to arrange training facilities, schedule work schedules for trainees to allow class attendance without disruption, and make the ECS system available as required to support hands-on training periods.

### **5.1.3.7 Logistics Systems Preparation**

#### **5.1.3.7.1 Purpose**

Logistics support plans provide for ECS maintenance and sparing of ECS sites in coordination with local site M&O personnel.

#### **5.1.3.7.2 Specification**

ECS logistics requirements specifications are provided in DID 613, Release 2.0 COTS Maintenance Plan.

The Release 2.0 COTS Maintenance Plan addresses the Release 2.0 maintenance concept and the responsibilities of the ECS Project for the commercial off-the-shelf hardware and software supplied by the ECS Contractor and government furnished equipment (GFE). The plan identifies the sources of maintenance support at ECS sites, periods of coverage, and responsibilities of the M&O staff and contracted maintenance providers. ECS sites included for maintenance support include GSFC, LaRC, NSIDC, EDC, and the EDF.

An overview of planned logistics provisions is provided below to present a complete summary of operational readiness actions in the period just before, and during, early system operations. The actual, specific logistics provisions found in updated, approved plans and procedures will supersede this overview.

#### **5.1.3.7.3 Schedule**

ECS COTS hardware and software is under vendor maintenance at ECS turnover when system operations commence.

Maintenance coverage during operations will sustain mission-critical operations. Generally, the principal period of maintenance (PPM) at the DAACs, EOC, SMC, and EDF will be 8AM to 5PM local, Monday through Friday, excluding local holidays.

Third-party maintenance providers and OEMs under maintenance subcontract have a 4 hour on-site response time after being notified of an equipment failure during the principal period of maintenance (PPM). Response for contracted maintenance support outside the PPM is provided on an as-required basis. If failures occur outside the PPM, the site should consider deferring OEM or maintenance subcontractor response until the next day if the malfunctioning system is not critical to ECS operations. This includes maintenance actions that would extend outside the PPM hours.

#### **5.1.3.7.4 ECS M&O Responsibilities**

Working under the general direction of the ECS M&O Manager, the ECS ILS Manager manages the ECS COTS maintenance program and other logistics operations. This includes the budget and expenditures associated with COTS Hardware and Software maintenance and the provisioning of spares in support of maintenance operations. The ILS Office (ILSO) assists ESDIS in the development of ECS COTS Hardware and Software maintenance policy; monitors and coordinates maintenance operations at the ECS sites; and manages maintenance support provided by vendors and OEMs.

Daily management and execution of DAAC, SMC, and EOC Hardware and Software maintenance is under the operational control of the DAAC, SMC, and EOC managers. Each site has a designated local maintenance coordinator (LMC) who executes maintenance support at the site, including problem diagnosis and isolation, maintenance support coordination, problem resolution, and recording COTS Hardware/Software maintenance actions performed at the site.

#### **Problem Resolution.**

The principal COTS Hardware and Software maintenance resource at the sites is the local maintenance coordinator (LMC), who also functions as the site's maintenance engineer. The LMC performs the initial fault diagnostics to isolate the cause of COTS Hardware and Software problems; determines the source of the maintenance support for the failed unit; and records the problem and its resolution into the management systems. The LMC may be the principal maintenance source for selected equipment having high  $A_0$  and or low MDT requirements. As a principal maintenance source, the LMC is responsible for isolating failures to the LRU and replacing it with an on-site spare. This self-maintenance approach provides faster maintenance response than contracted maintenance support. The LMC is immediately available, understands the ECS architecture and operational requirements, and represents a lower cost maintenance approach for certain critical equipment.

The LMC is assisted by the site's system and network administrators to isolate and resolve problems. The DAAC's local help desk (for science user problems) and systems administrators (for operator problems) initiate the maintenance action by preparing a Trouble Ticket. The trouble Ticket is forwarded to the System Administrator to isolate the problem to one of the following:

- a. System configuration -- System administrator resolves
- b. Network configuration -- Network administrator resolves
- c. Custom software (i.e. ECS custom Software or science Software) -- Sustaining engineers resolve
- d. COTS Software -- LMC and sustaining engineers resolve with Software vendor support
- e. COTS Hardware -- LMC resolves with OEM or maintenance subcontractor support

Trouble Tickets are monitored until problems are resolved and their resolution verified. Once verified, the system administrator or the LMC closes the Trouble Tickets and updates the Baseline Manager (if a change to the configuration baseline was required). Changes to custom Software are accomplished by ECS sustaining engineers using the Software configuration management system (i.e. ClearCase) following the ECS Software CM Plan and procedures described in Project Instruction 193-103-MG3-001, Configuration Management Procedures for the ECS Project.

The LMC coordinates resolution of COTS Hardware and Software maintenance actions. If problems cannot be corrected using site or contracted maintenance support resources, the LMC can escalate the problem to the SMC or the ILS Maintenance Coordinator

### **SMC Support.**

The SMC provides support for developed application Software, network, and design problems and monitors Trouble Tickets logged by the sites. Using the Trouble Ticketing system to recall similar problems, the SMC can assist the sites in problem diagnosis/resolution through reviewing previous configuration changes and problems reported against the equipment and subsystems. The SMC can also review similar problems experienced at other sites to identify possible causes and offer corrective actions.

### **Spares Provisioning.**

Spare parts may be provisioned at the sites to ensure replacement COTS LRUs are available to effect the immediate repair of failed critical equipment. These sparing determinations are documented in the Replacement and Spare Parts List (DID 618). Spares provisioning levels may be adjusted after sufficient failure data is gathered during ECS operations to warrant adjusting site spares quantities and types. Spares used at the sites are reported to the ILS Maintenance Coordinator, who will replenish site stocks, as needed. The use and replenishment of site spares is monitored by the ILS Maintenance Coordinator.

## 5.2 SMC Operational Readiness Exercises (ORE)

### 5.2.1 Introduction

The objective of the SMC Operational Readiness Exercise (ORE) is to demonstrate the ability of ECS system facilities and infrastructure at the SMC to perform ongoing operations at the levels required for ECS Release 2.0.

The SMC exercises shall be held under the coordination of a test director to verify that the functional capabilities of Release 2.0 are ready to support operations. The ORE shall concentrate on operational procedures, human interfaces, and operational M&O databases.

It is the responsibility of the test participants to determine if problems have occurred. If there is doubt they will immediately address their concerns to the Test Conductor. The Test Conductor is, likewise, responsible to carefully follow the conduct of the test constantly, looking for deviations or anomalies. Actions to be taken in response to unscheduled events are detailed in the Procedure for Control of Unscheduled Activities During Verification for the ECS Project (DID 404/VE1). Verification of Hardware Status

### 5.2.2 SMC Operational Readiness Exercises

#### 5.2.2.1 Verification of System Status

This exercise of Verification of System Status verifies that all SMC Systems are on-line and operational. Using procedures from DID 611, System Monitoring Chapter, verification will be conducted of all managed systems. Bringing up the IP map in HP OpenView, and confirming that all icons are in the “green” state, will confirm that the LSM at the SMC is on-line and operational.. This test is contingent on the Hp OpenView database being populated prior to running the exercise. This test must be completed before continuing on to Verification of Communication Software Status.

<b>Chapter 7 System Monitoring - HP OpenView</b> <b>Looking at Maps for New Nodes 7.1.4</b> <b>Checking for Event Notifications 7.1.6</b> <b>DID 611 Operating Procedures</b>	The purpose of this test is to verify that all systems or operational and on-line.
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#### 5.2.2.2 Verification of Communication Software Status

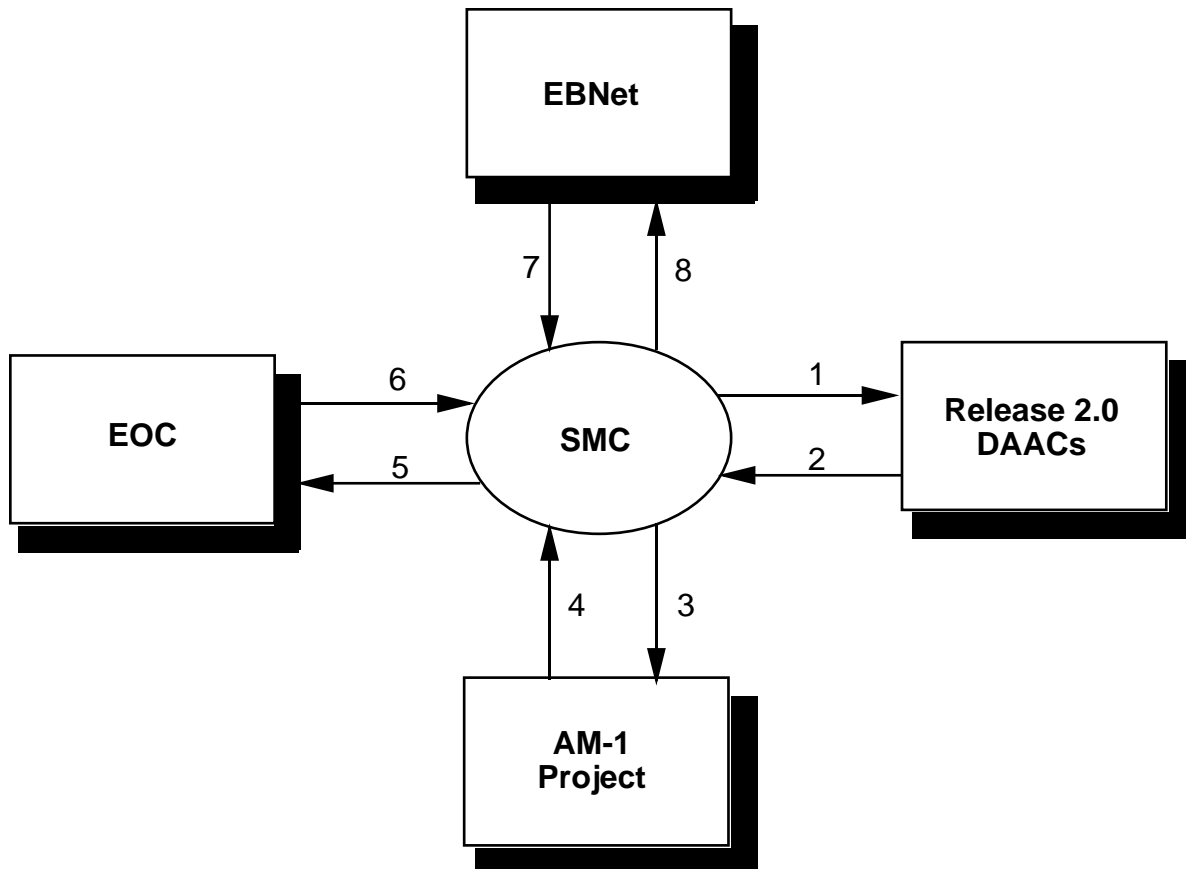
This exercise of Acceptance Test Procedure sequences verify the capability of the user/operators at the SMC to receive and handle broadcast messages. Users/operators at the SMC broadcast messages to other DAACS, receive messages and receipt acknowledgments.

<b>Inter-DAAC and DAAC-SMC Communications</b> <b>ATO Test Procedure No.: A120110.020\$\$</b>	The procedure tests the capability of the SMC to send messages to and receive messages from the DAACs, EDOS, EBnet, the EOC.
<b>ECS Internal Interfaces</b> <b>ATO Test Procedure No.: A080180.090\$\$</b>	This test case verifies the capability for the SMC to communicate with the , GSFC, LaRC, EDC, EDOS and EOC.



### 5.2.2.3 Verification of External I/F Status

Figure 5-2. SMC Interface Nodes, is a graphical representation of the interfaces between EGS sites associated with the SMC. A summary of the content and carriers associated with the data flowing across SMC interfaces is shown in Table 5-6.



**Figure 5-1. SMC Interface Nodes**

**Table 5-6. SMC Interfaces**

Flow No.	Source	Destination	Data Types	Data Volume	Frequency
1	SMC	Rel 2.0 DAACs (MSS)	Policies	low	as required
1	SMC	Rel 2.0 DAACs (MSS)	Conflict Resolution	low	as required
1	SMC	Rel 2.0 DAACs (MSS)	Procedures	low	as required
1	SMC	Rel 2.0 DAACs (MSS)	Directives	low	as required
2	Rel 2.0 DAACs (MSS)	SMC	Conflict Resolution Request	low	as required
2	Rel 2.0 DAACs (MSS)	SMC	Status	low	as required
2	Rel 2.0 DAACs (MSS)	SMC	Performance	low	as required
3	SMC	AM-1	Query	low	as required
4	AM-1	SMC	Status	low	as required
5	SMC	EOC (LSM)	Status Request	low	as required (via email)
6	EOC (LSM)	SMC	Status	low	as required (via email)
7	EBnet	SMC	Status, Fault, Performance	low	as required
8	SMC	EBnet	Status Request	low	as required

**5.2.2.3.1 EOC, AM-1, Other DAACS, and EBnet**

The SMC interface with EOC, at Release 2.0 is via the LSM at the EOC. This interface is used for early testing of the EOC - SMC interface by transfer of status information and performance summary data from the EOC to the SMC.

The SMC interface with AM-1 is to monitor the status of the AM-1. At Release 2.0, this interface is via email messages.

At Release 2.0, the SMC will interface with the GSFC, LaRC, and EDC DAACs. Policy information, originating from the ESDIS project office, system and network performance and management summary data, and user registration data will be exchanged between the SMC and the Local System Management (LSM) element at each DAAC.

The EOSDIS Backbone Network (EBnet) is the primary interface between the SMC, DAACs, EDOS, other ECS assets, and non-ECS elements. The SMC interface with the EBnet is to monitor and exchange status information between the EBnet and ECS.

**Interface Verification Exercises**

Verification of the above external interfaces are made using the two ATO procedures described below

<b>Inter-DAAC and DAAC-SMC Communications</b> <b>ATO Test Procedure No.: A120110.020\$S</b>	The procedure tests the capability of the SMC to send messages to and receive messages from the Release A DAACs, TSDIS, EBnet, the EOC.
<b>ECS Internal Interfaces</b> <b>ATO Test Procedure No.: A080180.090\$S</b>	This test case verifies the capability for the SMC to communicate with the , GSFC, LaRC, EDC, and EOC.

### 5.2.2.3.2 NSI

The Release A interface between ECS and NSI at GSFC will occur via the GSFC Campus Isolation LAN. All traffic between ECS and NSI will flow across this switched-FDDI LAN. ECS will connect to the ISO-LAN in Building 32 via two routers (one providing connectivity to the ECS GSFC DAAC and SMC and the other connecting to the EOC), and NSI will connect to the ISO-LAN in Building 1.

<b>Inter-DAAC and DAAC-SMC Communications</b> <b>ATO Test Procedure No.: A120110.020\$S</b>	The procedure tests the capability of the SMC to send messages to and receive messages from the Release A DAACs, TSDIS, EBnet, the EOC.
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## 5.2.3 SMC Participation in ECS Release A Readiness Exercises

This section describes a hierarchy of system readiness verification testing:

- ECS System Functionality and Internal Interfaces
- ECS External Interfaces

The hierarchy begins with the SMC verifying internal readiness, expands to inter-DAAC, and DAAC to EOS connectivity, and then to ECS system network readiness verification, and concludes with verification of operability of ECS system connectivity to external systems. The readiness verification activity culminates in an Operational Readiness Review which declares the ECS ready to support system operations.

Description of the readiness activities for each component of ECS, or each site, begins with identification and description of those facilities, hardware, software, databases, personnel, procedures and other capabilities which are prerequisite to conducting operational readiness exercises.

The SMC will formally participate in engineering meetings, design reviews, and project milestone reviews, and project milestone review to support ORR activities. The SMC will also provide the necessary resources to fully implement SEO ORR directives. These resources will include system administration, configuration management, and operational support.

## 5.3 SMC Participation in ECS ORR

The ECS Release 2.0 Operational Readiness Review (ORR) will be conducted to determine the readiness of each ECS element to provide operational services. The review will be conducted in a distributed manner, via Operations Teleconference (OPSTELE), with DAAC, SMC, and EOC personal at their own facilities, under the coordination of a test director/chairperson at the SMC. The ORR will concentrate on confirming the operational readiness of hardware and software, operational procedures, human interfaces, and operational M&O database readiness.

## **6. Regular ECS Operational Readiness Status Monitoring**

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ECS Operational Readiness Exercises are intended to be used on a continuing basis in normal operations. Portions of the exercises can be used to verify the connectivity and operational status of portions of the system after periods of downtime for maintenance or system modification. The entire package of exercises followed by an Operational Readiness Review (ORR) should be executed for major system Release installations and in advance of AM-1 Mission events.

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## Appendix A. Release 2.0 Prerequisites Checklist of Turnover Activities

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### A1. AM-1/ECS ORE Prerequisites Checklist

***Table A-1. Acceptance Test Prerequisites***

Date Complete	Accepted By	Responsible Organization	Activity	Document Reference
		SCDO	ECS Release 2.0 Integration and Test (I&T)	3.1.3.1
		ESDIS	EOS Ground System (EGS) I&T	3.1.4
		ECS DAAC Managers	ECS facility provisions ready for occupancy and use	3.1.1
		ECS M&O	COTS hardware and software installed and tested	3.1.1.3
		ECS M&O	Facilities certified ready for installation of ECS custom software	3.1.1.3
		ECS M&O	Site survey	3.1.5.5

**Table A-2. ECS Release 2.0 System Turnover Activities (1 of 2)**

Date Complete	Accepted By	Responsible Organization	Activity	Document Reference
<b>Acceptance Test Prerequisites</b>				
		ATO at EDF	Walkthrough Acceptance Test (AT) Procedure	3.1.3.4
		ATO	Inventory resources	3.2.8.2
		ATO	Execute critical acceptance test sequences and test cases against the I&T baseline	3.1.3.4
		ATO	File Discrepancies observed during acceptance test preparation as NCRs.	3.1.3
		Release Development	Formally install final version of the custom software at applicable operational sites	3.1.3
<b>Acceptance Test Activities</b>				
		ATO	Site specific 1: System Management	3.1.3.3
		ATO	Site specific 2: Push	3.1.3.4
		ATO	Site specific 3: Pull	3.1.3.4
		ATO	Site specific 4: End-to-End.	3.1.4
		ATO	Site specific Acceptance Test demonstration	3.1.3
		ATO	"All up" 1: System Management	3.1.3.3
		ATO	"All up" 2: Push	3.1.3
		ATO	"All up" 3: Pull	3.1.3
		ATO	"All up" 4: End-to-End.	3.1.4
		ATO	"All up" Acceptance Test demonstration	3.1.3
		CMO	Maintain Release Baseline in the EDF System Development Library (SDL)	3.1.3.2
		ATO	Formally file Discrepancies observed during the Acceptance Test Phase as NCRs	3.1.3

**Table A-2. ECS Release 2.0 System Turnover Activities (2 of 2)**

Date Complete	Accepted By	Responsible Organization	Activity	Document Reference
		ATO	Report results of NCR correction and successful retest to the ECS Release 2.0 CCB	3.1.3
		CMO	Physical Configuration Audit (PCA)	3.1.5.1
		QO	Functional Configuration Audit (FCA)	3.1.5.1
		CMO	Version Description Document (VDD)	3.1.5.1
		ATO	DID 412 - Overall Acceptance Test Report	3.1.7
		QO	DID 506 - Audit Reports	3.1.5.1
		ESDIS	Formal decision to proceed to operations	3.3
<b>Deployment</b>				
		Deployment Team	Upgrade Release 2.0 infrastructure to Release B level	3.1.3
		Deployment Team	Installation and test Release 2 software	3.1.3



**Table A-3. EGS Integration and Test**

Date Complete	Accepted By	Responsible Organization	Activity	Document Reference
		EGS I&T Team	ECS Rel 2 SDPS Confidence Test	
		EGS I&T Team	AM-1Interface Testing	
		EGS I&T Team	AM-1Mission Version Science SW I&T	
		EGS I&T Team	ECS Rel 2/ AM-1 Project I&T	
		EGS I&T Team	EGS5 ECS to Landsat 7 Interoperability Confidence Test	
		EGS I&T Team	EGS7 EGS Security Confidence Test	
		EGS I&T Team	EGS9 ASTER Science Operations Confidence Test	
		EGS I&T Team	EGS10 AM1 Science Data Processing End-To-End Confidence Test	
		EGS I&T Team	EGS11 EGS Science Data System Performance Test	

**Table A-4. DAAC Release A Preparation (1 of 3)**

Date Complete	Accepted By	Responsible Organization	Activity	Document Reference
<b>Configuration Management</b>				
		DAAC CCB	Approve baseline transfer plans	3.1.5
		DAAC CCB	Define transfer procedures	3.1.5
		DAAC CCB	Implement transfer procedures	3.1.5
		DAAC CCB	Complete ECS Software CM Plan and procedures	3.1.5
		ECS SEO ATO	Handoff delivered product from Acceptance Test Organization	3.1.5
		ECS SEO ATO	Handoff delivered product from Acceptance Test Organization	3.1.5
		ECS SEO	Install ECS common software in M&O software library	3.1.5
		ECS SEO	Install site-specific software in M&O software library	3.1.5
		Science SW I&T	Deliver science software to the DAAC	3.1.5
		DAAC CCB	Install science and other non-ECS developed software in an independent M&O software library	3.1.5
<b>Database Preparation</b>				
		DAAC DBA SW support	Prepare Science Data Server Database for operations	3.1.5.2
		DAAC SysAdmin	Prepare CSS Database (ACL database) for operations	3.1.5.2
		DAAC DBA SW support	Prepare PDPS Database for operations	3.1.5.2
		DAAC Sci SW I&T Supp Eng	Prepare Ingest Database for operations	3.1.5.2

**Table A-4. DAAC Release A Preparation (2 of 3)**

Date Complete	Accepted By	Responsible Organization	Activity	Document Reference
		DAAC DBA SW support	Prepare MSS Database for operations	3.1.5.2
		DAAC DBA SW support	Prepare Data Manager Database for operations	3.1.5.2
		DAAC DBA SW support	Prepare Advertiser Database for operations	3.1.5.2
<b>Operational Procedures Preparation</b>				
		SEO M&O	Deliver 611 Operational Procedures	3.1.5.3
		DAAC M&O	Markup Operational Procedures during Acceptance Test	3.1.5.3
		DAAC M&O	Update 611 Operational Procedures	3.1.5.3
<b>Maintenance &amp; Operations Staffing</b>				
		M&O Managers	Staff at beginning level for CSR	3.1.5.4
		M&O Managers	Staff to operating level for ORR	3.1.8
<b>Maintenance &amp; Operations Training</b>				
		ECS SEO	Conduct Preliminary ECS training for test staff	3.1.9
		ECS SEO	Conduct operations ECS training	3.1.9
		ECS SEO	Conduct operations COTS training	3.1.9
		DAAC	Certify operations staff members	3.1.9
<b>Logistics Systems Preparation</b>				
		ILS Manager	Contract with third party providers and OEMs for maintenance support	3.1.5.5
		ESDIS ILSO	Develop ECS COTS Hardware and Software maintenance policy in Project Instruction 193-103-MG3-00, CM Procedures for ECS	3.1.5.5

**Table A-4. DAAC Release A Preparation (3 of 3)**

Date Complete	Accepted By	Responsible Organization	Activity	Document Reference
		ESDIS ILSO	Complete Replacement and Spare Parts List (DID 618)	3.1.5.5
		ILSO ESDIS PO	Presentation to ILS Management Team of recommendations regarding spare quantities and locations	3.1.5.5
		ILSO ESDIS PO	Approval of recommendations regarding spare quantities and locations at RRR	3.1.5.5
		ILSO	Initial provision of spare parts to sites	3.1.5.5

## **A2. AM-1/ ECS ORE Completion Checklist**

**Table A-5: Operational Readiness Exercises**

Date Complete	Accepted By	Responsible Organization	Activity	Document Reference
		DAAC M&O	Site Startup Confidence Test	3.2
		DAAC M&O	ECS Hardware and Software Configuration Items Review	3.2
		DAAC M&O	Inter-DAAC and DAAC-SMC Communications	3.2
		DAAC M&O	Network Configuration and Status	3.2
		DAAC M&O	DAAC M&O Interfaces	3.2
		DAAC M&O	GSFC DAAC External Interfaces	3.2
		DAAC M&O	GSFC DAAC Data Requests Receipt, Validation, and Deliver Archived AM-1 Data	3.2
		DAAC M&O	ECS Internal Interfaces	3.2
		DAAC M&O	AM-1 Data Ingest from EDOS at the GSFC DAAC	3.2
		DAAC M&O	Orbit/Attitude Data Ingest from FDF	3.2
		DAAC M&O	ECS Overall Capabilities	3.2
		DAAC M&O	Test Support in an Operational DAAC	3.2

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## **Appendix B. Draft Maintenance and Operations Checklists for ORR**

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**(Derived from Operations Working Group Reviews of Fall 1997)**

**I. ESDIS SMC/SEO System Science Operations Readiness Checklist  
for EOS AM1, LANDSAT 7, METEOR Missions**

**1. Science System Management Services**

**1.1 Science System Management at ESDIS**

**1.1.1.1 SMC Operations Supervisor, Readiness and Performance Assurance**

- a) Scheduling SMC Operations personnel
- b) Reporting SMC operations performance
- c) Assessing & assigning SMC/SEO Trouble Tickets
- d) Assessing and prioritizing SMC/SEO CCRs
- e) SMC/SEO Training and certification

**1.1.1.2 Resource Management (SMC Resource Controller)**

- a) Reconfiguring SMC/SEO HW
- b) Reconfiguring SMC/SEO SW
- c) Reconfiguring SMC/SEO LAN & DCE cells
- d) Maintaining SMC processing and storage resource profiles
- e) Monitoring, analysis and reporting SMC system utilization and performance
- f) Coordinating local network activities with external NOCs

**1.1.1.3 Resource Planner (SMC Resource Controller)**

- a) Coordinating proposed resource schedules
- b) Creating, editing, viewing and approving resource reservations
- c) Activating, publishing & distributing resource schedules

d) Cancelling resource reservations

#### 1.1.1.4 SMC System Administration & Computer Operations (SMC System Admin)

- a) System startup and shutdown
- b) System backups and restores
- c) System log maintenance
- d) User administration
- e) Workstation/PC installation/deinstallation
- f) SW transfer installation/deinstallation
- g) COTS SW installation/deinstallation
- h) Security analysis & reporting
- i) Network administration, reporting & problem diagnosis
- j) System monitoring and status reporting

#### 1.1.1.5 SMC Data Base Administration (SMC System Admin, Computer Operator)

- a) Product installation and disk storage management
- b) Server startup and shutdown
- c) User accounts and privileges
- d) Security and auditing
- e) Problem detection, tuning and performance monitoring
- f) Backup and recovery
- g) Planning & reporting

#### 1.1.1.6 SMC Configuration Management Administration

- a) Recording, reporting status and managing configuration change requests (CCRs)
- b) Maintaining, archiving & retrieving CCR database



- c) Coordinating CCRs with external interfaces, requesting impact analysis
- d) Recording, reporting, managing & distributing changes to custom system SW
- e) Maintaining, archiving & retrieving SW Library
- f) Updating & maintaining access privileges to SW library
- g) Recording, reporting and maintaining system-level changes to the as-built baseline
- h) Generating configuration status accounting records, inventory of version control items
- i) Maintaining, archiving & retrieving controlled documentation

#### 1.1.1.7 SMC Maintenance Coordination

- a) Reviewing assigned Trouble Tickets, identify source of maintenance support
- b) Conducting HW fault diagnosis, isolate failure, replace with spare
- c) Analysis of previous maintenance actions
- d) Determine/report present baseline configuration
- e) Coordinating & facilitating COTS HW & SW vendor problem resolution and upgrades
- f) Escalating irreconcilable COTS HW and SW problems
- g) Enter Trouble Ticket resolutions following COTS repair
- h) Enter details of maintenance action into inventory & logistics system
- i) Record emergency baseline configuration changes in DDTS
- j) Prepare CCRs resulting from maintenance actions

#### 1.1.1.8 SMC ILS Administration (SEO ILS Administrator)

- a) Issuing COTS SW upgrades, spares & consumables
- b) Shipping failed HW to maintenance vendors
- c) Monitoring, recording & reporting vendor repair actions
- d) Recording receipt of COTS SW upgrades, spares and consumables
- e) Storing COTS SW upgrades, spares & consumables
- f) Notification & Reporting inventories, changes, lost/damaged property

#### 1.1.1.9 System Engineer (TBD)

#### 1.1.1.10 SEO SW Maintenance Engineer

- a) Performing SW builds and compiles
- b) Making custom SW available for distribution
- c) Providing test cases, input & output test data
- d) Making changes to custom SW and database control files
- e) Providing traceability to previous configurations
- f) Providing changes to baseline documentation
- g) Recording SW maintenance problems
- h) Evaluating results of I&T
- i) Providing delivery notification
- j) Checking source code and scripts comply with EOS & DAAC coding standards
- k) Performing stand-alone testing
- l) Distributing science SW source files, documentation, test data
- m) Holding software reviews

#### 1.1.1.11 SEO System Test Engineer

- a) Testing SW upgrades
- b) Analysing version upgrade test results
- c) Recording test problems
- d) Providing training exercise environments

## **1.2 Science System Monitoring & Coordination at ESDIS**

### **1.2.1.1 Science System Administration**

- a) Providing system-level management of directory services
- b) Investigating and documenting problems on DAAC hosts and workstations

### **1.2.1.2 Science System Configuration Management Administration**

- a) Recording, reporting and tracking system-level problems
- b) Recording, reporting and managing system-level CCRs
- c) Coordinating system-level CCR impact assessments
- d) Propagating system-level CCR resolutions
- e) Recording, reporting, managing and distributing system-level SW changes
- f) Recording, reporting and managing system-level changes to the as-built baseline
- g) Maintaining inventory of system-level control items
- h) Generating status reports for system-level problems
- i) Providing instructions and monitoring system-level problem resolutions
- j) Generating status report for system-level CCRs
- k) Providing instructions and monitoring progress for system-level changes

### **1.2.1.3 Science System Network Analysis**

- a) Monitoring & Reporting performance of Ebnet, NSI, DAAC networks
- b) Coordinating system-level configuration change plans & schedules with Ebnet, NSI
- c) Maintaining and distributing network events schedules
- d) Performing fault analysis
- e) Monitoring network security and responding to security alarms & events

#### 1.2.1.4 Science System Fault Management

- a) Monitoring DAAC resources
- b) Collecting system-wide fault data, trending and analysis

#### 1.2.1.5 Science System Performance Analysis

- a) Reviewing DAAC performance, resource utilization problems and trend reports
- b) Conducting end-to-end performance analysis, evaluations, trending
- c) Coordinating with external systems for temporary service change requests

#### 1.2.1.6 Science System Resource Monitoring & Coordination

- a) Performing remote problem monitoring during unattended shifts at DAACs
- b) Developing plans and coordinating schedules for system-wide events
- c) Reviewing, recommending resolutions to cross-DAAC production planning conflicts

#### 1.2.1.7 SMC Security Control

- a) Monitoring, auditing and reporting system-wide adherence to security practices

## **II. GDAAC Checklist**

### 2.1 Science Software I&T at the GSFC DAAC

#### 2.1.1 Science Coordination

#### 2.1.2 Science Data Specialist

- a) acquiring the Delivered Algorithm Packages (DAP)
- b) inspecting the DAP contents
- c) reviewing science documentation

### 2.1.2.1 MODIS Science Algorithms

PGE01 L1 Level 1A and Geolocation

PGE02 L1B Calibrated radiances

PGE03 Cloud Mask and Atmospheric profiles

PGE06 L2 Cloud Properties

PGE04 L2 Atmosphere (land and ocean aerosols and precipitable water)

PGE05 L3 Interim Land Aerosol

PGE39 L3 Combined Atmosphere Product

PGE09 L2 Ocean Color

PGE17 L3 Ocean Color

PGE10 L2 Sea Surface Temperature

PGE19 L3 Sea Surface Temperature

PGE20 L3 Oceans Interim Daily

PGE49 L3 Oceans Interim Weekly

PGE50 L3 Ocean Interim 3 week

PGE51 L3 Ocean 3 Week Reference (mfill)

PGE53 L3 Ocean Daily (mcloud)

PGE54 L3 Ocean Weekly

PGE11 L2 Reflectance

PGE13 L2G Reflectance/Fire Tile

PGE16 L2 Land Surface Temperature

PGE12A L2G Pointers Tile

PGE12B L2G Geo Angles Tile

PGE07 L2 Snow

PGE14 L2G Snow

PGE08 L2 Sea Ice

PGE15 L2G Sea Ice

## PGE18 Ocean Productivity Yearly

### 2.1.3 CM Administration

a) recording, reporting, managing and distributing science software

#### 2.1.3.1 MODIS CM Administration

### 2.1.4 Science Software I&T Support Engineering

a) performing standards checking

#### 2.1.4.1 MODIS standards

### 2.1.5 Production Planning

a) populating, maintaining the production planning database

#### 2.1.5.1 MODIS production planning database

## **III. EDAAC Checklist for EOS AM1, LANDSAT 7, METEOR Missions**

### **1 Science Software I&T at the EDC DAAC**

This function takes each mission from algorithm delivery to a production readiness state.

#### 1.1 SSIT functions for ASTER Mission

The following sections identify the operations functions necessary to support SSIT for the ASTER instrument team.

##### 1.1.1 ASTER Science Coordination function

Identifies the procedures followed by the Science Coordinator (or position fulfilling the role as Science Coordinator for ASTER). Lists the documented policies, procedures, and/or checklists for governing the development and coordinating agreements between ASTER and all DAAC operations (e.g., SSIT, Ingest, Production, Archive, Distribution, and User Services), and whether they have been completed for all of the agreements necessary to support the operational interface with the ASTER Instrument Team.

##### 1.1.2 ASTER Science Data Specialist function

Identifies the ASTER mission operations agreements and procedures followed by the Science Data Specialist (or position fulfilling the role as ASTER Science Data Specialist). Lists the ongoing and startup coordination and system environment setup procedures, the mission specific

algorithm delivery packages, and whether the agreements are supported and procedures have been completed or successfully exercised for ASTER at-launch SSI&T requirements.

#### 1.1.2.1 ASTER SSI&T Agreements

a) Version 1.1 Science Software Integration and Test Plan for the ASTER Science Instrument at the EDC Distributed Active Archive Center (DAAC), June 5, 1997.

#### 1.1.2.2 ASTER Science Data Specialist environment setup

a) SSIT Manager setup procedures

b) SSIT Manager startup

c) SSIT checklist setup

d) SSIT checklist update

#### 1.1.2.3 ASTER delivery package and production readiness

List and status of all delivery packages and procedures applied by the Science Data Specialist to perform SSI&T:

a) Decorrelation Stretch

b) Atmospheric Correction TIR

c) Atmospheric Correction VNIR & SWIR

d) Scene Classification

e) Surface Temperature/Emissivity

f) Brightness Temperature

g) DEM

h) PGEs equivalent to above, to produce browse products. PGEs to perform quality assurance for all standard products.

The following checklist is repeated for each DAP:

x.1) FTP acquisition of the Delivered Algorithm Packages (DAP)

x.2) DAP unpack and inspection

x.3) Science documentation review

- x.4) FORTRAN 77 Check
- x.5) FORTRAN 90 Check
- x.6) C Check
- x.7) Ada Check
- x.8) Prohibited Function Check
- x.9) Process Control File Check
- x.10) Prologs Extraction
- x.11) PCF Updates
- x.12) Toolkit setup
- x.13) Link with SCF Toolkit
- x.14) Link with DAAC Toolkit
- x.15) Link to Status Message Facility
- x.16) SCF version execution environment setup
- x.17) SCF version execution
- x.18) PGE log files examination (SCF version)
- x.19) File comparisons (SCF version)
- x.20) DAAC version setup
- x.21) DAAC version execution
- x.22) PGE log files examination (DAAC version)
- x.23) File comparisons (DAAC version)
- x.24) Product metadata views
- x.25) Product data views

#### 1.1.2.4 Science SW CM Administration for ASTER

List and status of all delivery packages and procedures applied by CM Administration to perform SSI&T:

- a) Decorrelation Stretch
- b) Atmospheric Correction TIR



- c) Atmospheric Correction VNIR & SWIR
- d) Scene Classification
- e) Surface Temperature/Emissivity
- f) Brightness Temperature
- g) DEM
- h) PGEs equivalent to above, to produce browse products. PGEs to perform quality assurance for all standard products.

The following checklist is repeated for each DAP:

- x.1) Versioned Object Base created in ClearCase
- x.2) View created in ClearCase
- x.3) View set in ClearCase
- x.4) New Directory created in ClearCase
- x.5) Files imported into ClearCase
- x.6) File Checkout
- x.7) File Checkin

#### 1.1.2.5 Earth Science Data Types for ASTER

List and status of all delivery packages and procedures applied by SSI&T Support Engineers to perform SSI&T:

- a) Decorrelation Stretch
- b) Atmospheric Correction TIR
- c) Atmospheric Correction VNIR & SWIR
- d) Scene Classification
- e) Surface Temperature/Emissivity
- f) Brightness Temperature
- g) DEM
- h) PGEs equivalent to above, to produce browse products. PGEs to perform quality assurance for all standard products.

The following checklist is repeated for each DAP:

- x.1) Metadata Configuration File compared to ESDT Granule Metadata
- x.2) New ESDT version created from MCF
- x.3) New ESDT creation
- x.4) ESDT registration
- x.5) ESDT validation

#### 1.1.2.6 ASTER Production Planning

List and status of all delivery packages and procedures applied by production planning to complete SSI&T by updating PDPS databases:

- a) Decorrelation Stretch
- b) Atmospheric Correction TIR
- c) Atmospheric Correction VNIR & SWIR
- d) Scene Classification
- e) Surface Temperature/Emissivity
- f) Brightness Temperature
- g) DEM
- h) PGEs equivalent to above, to produce browse products. PGEs to perform quality assurance for all standard products.

The following checklist is repeated for each DAP:

- x.1) ESDT metadata update
- x.2) PGE science metadata update
- x.3) SSIT operations metadata update
- x.4) Metadata creation in science data server (for static input files)
- x.5) Static data insert into science data server
- x.6) Target metadata creation for dynamic granule
- x.7) Test dynamic file insert into science data server
- x.8) PGE executable package insert into science data server

- x.9) Test data subscription registration
- x.10) New product request creation
- x.11) New production plan creation
- x.12) Production History log file review
- x.13) PGE output metadata review

## 1.2 SSIT functions at EDC for the MODIS Mission

The following sections identify the EDC operations functions necessary to support SSIT for the MODIS instrument team.

### 1.2.1 MODIS Science Coordination

### 1.2.2 Science Data Specialist function for MODIS

#### 1.2.2.1 MODIS Operations Agreements

a) MODIS V1 Science Software Integration and Test Procedures and Agreement with the EROS Data Center DAAC, April, 1997 Draft.

#### 1.2.2.2 Science Data Specialist environment setup for MODIS

- a) SSIT Manager setup procedures
- b) SSIT Manager startup
- c) SSIT checklist setup
- d) SSIT checklist update

#### 1.2.2.3 MODIS delivery package and production readiness

List and status of all delivery packages and procedures applied by the Science Data Specialist to perform SSI&T:

- a) PGE25 L3 Vegetation Indices(VI) 8 days
- b) PGE26 L3 Vegetation Indices(VI) 8 days
- c) CMG PGE27 L3 Vegetation Indices(VI) 16 days
- d) PGE28 L3 Vegetation Indices(VI) month
- e) PGE21 L3 Fire Daily
- f) PGE29 L3 Fire 8 days
- g) PGE30 L3 Fire 16 days

- h) PGE22 L3 BRDF/Subset
- i) PGE23 L3 BRDF/Albedo
- j) PGE33 L3 LAI/FPAR Daily
- k) PGE34 L3 LAI/FPAR 8 days
- l) PGE37 L4 Net Primary Productivity Daily
- m) PGE40 L3 Land Cover Month
- n) PGE41 L3 Land Cover 3 months

The following checklist is repeated for each DAP:

- x.1) FTP acquisition of the Delivered Algorithm Packages (DAP)
- x.2) DAP unpack and inspection
- x.3) Science documentation review
- x.4) FORTRAN 77 Check
- x.5) FORTRAN 90 Check
- x.6) C Check
- x.7) Ada Check
- x.8) Prohibited Function Check
- x.9) Process Control File Check
- x.10) Prologs Extraction
- x.11) PCF Updates
- x.12) Toolkit setup
- x.13) Link with SCF Toolkit
- x.14) Link with DAAC Toolkit
- x.15) Link to Status Message Facility
- x.16) SCF version execution environment setup
- x.17) SCF version execution
- x.18) PGE log files examination (SCF version)
- x.19) File comparisons (SCF version)
- x.20) DAAC version setup

- x.21) DAAC version execution
- x.22) PGE log files examination (DAAC version)
- x.23) File comparisons (DAAC version)
- x.24) Product metadata views
- x.25) Product data views

#### 1.2.2.4 Science SW CM Administration for MODIS

List and status of all delivery packages and procedures applied by CM Administration to perform SSI&T:

- a) PGE25 L3 Vegetation Indices(VI) 8 days
- b) PGE26 L3 Vegetation Indices(VI) 8 days
- c) CMG PGE27 L3 Vegetation Indices(VI) 16 days
- d) PGE28 L3 Vegetation Indices(VI) month
- e) PGE21 L3 Fire Daily
- f) PGE29 L3 Fire 8 days
- g) PGE30 L3 Fire 16 days
- h) PGE22 L3 BRDF/Subset
- i) PGE23 L3 BRDF/Albedo
- j) PGE33 L3 LAI/FPAR Daily
- k) PGE34 L3 LAI/FPAR 8 days
- l) PGE37 L4 Net Primary Productivity Daily
- m) PGE40 L3 Land Cover Month
- n) PGE41 L3 Land Cover 3 months

The following checklist is repeated for each DAP:

- x.1) Versioned Object Base created in ClearCase
- x.2) View created in ClearCase
- x.3) View set in ClearCase
- x.4) New Directory created in ClearCase

- x.5) Files imported into ClearCase
- x.6) File Checkout
- x.7) File Checkin

#### 1.2.2.5 Earth Science Data Types for MODIS

List and status of all delivery packages and procedures applied by SSI&T Support Engineers to perform SSI&T:

- a) PGE25 L3 Vegetation Indices(VI) 8 days
- b) PGE26 L3 Vegetation Indices(VI) 8 days
- c) CMG PGE27 L3 Vegetation Indices(VI) 16 days
- d) PGE28 L3 Vegetation Indices(VI) month
- e) PGE21 L3 Fire Daily
- f) PGE29 L3 Fire 8 days
- g) PGE30 L3 Fire 16 days
- h) PGE22 L3 BRDF/Subset
- i) PGE23 L3 BRDF/Albedo
- j) PGE33 L3 LAI/FPAR Daily
- k) PGE34 L3 LAI/FPAR 8 days
- l) PGE37 L4 Net Primary Productivity Daily
- m) PGE40 L3 Land Cover Month
- n) PGE41 L3 Land Cover 3 months

The following checklist is repeated for each DAP:

- x.1) Metadata Configuration File compared to ESDT Granule Metadata
- x.2) New ESDT version created from MCF
- x.3) New ESDT creation
- x.4) ESDT registration
- x.5) ESDT validation

#### 1.2.2.6 Production Planning

List and status of all delivery packages and procedures applied by production planning to complete SSI&T by updating PDPS databases:

- a) PGE25 L3 Vegetation Indices(VI) 8 days
- b) PGE26 L3 Vegetation Indices(VI) 8 days
- c) CMG PGE27 L3 Vegetation Indices(VI) 16 days
- d) PGE28 L3 Vegetation Indices(VI) month
- e) PGE21 L3 Fire Daily
- f) PGE29 L3 Fire 8 days
- g) PGE30 L3 Fire 16 days
- h) PGE22 L3 BRDF/Subset
- i) PGE23 L3 BRDF/Albedo
- j) PGE33 L3 LAI/FPAR Daily
- k) PGE34 L3 LAI/FPAR 8 days
- l) PGE37 L4 Net Primary Productivity Daily
- m) PGE40 L3 Land Cover Month
- n) PGE41 L3 Land Cover 3 months

The following checklist is repeated for each DAP:

- x.1) ESDT metadata update
- x.2) PGE science metadata update
- x.3) SSIT operations metadata update
- x.4) Metadata creation in science data server (for static input files)
- x.5) Static data insert into science data server
- x.6) Target metadata creation for dynamic granule
- x.7) Test dynamic file insert into science data server
- x.8) PGE executable package insert into science data server
- x.9) Test data subscription registration
- x.10) New product request creation



- x.11) New production plan creation
- x.12) Production History log file review
- x.13) PGE output metadata review

## **2. Ingest (Archive Manager)**

## **3. Production and Production Plans (Production Monitor)**

## **4. Product Archive and Distribution ( Archive Manager)**

## **5. Client & Interoperability & Data Management (User Services)**

## **6. Science System Management Services at EDC**

### **6.1.1 Operations Supervisor, Readiness and Performance Assurance**

- a) Scheduling Operations personnel
- b) Reporting mission operations performance
- c) Assessing & assigning Trouble Tickets
- d) Assessing and prioritizing CCRs
- e) Training and certification

### **6.1.2 Resource Manager**

- a) Reconfiguring HW
- b) Reconfiguring SW
- c) Reconfiguring LAN & DCE cells
- d) Maintaining processing and storage resource profiles
- e) Monitoring, analysis and reporting system utilization and performance

- f) Coordinating local network activities with external NOCs

#### 6.1.3 Resource Planner

- a) Coordinating proposed resource schedules
- b) Creating, editing, viewing and approving resource reservations
- c) Activating, publishing & distributing resource schedules
- d) Cancelling resource reservations

#### 6.1.4 System Administration & Computer Operations

- a) System startup and shutdown
- b) System backups and restores
- c) System log maintenance
- d) User administration
- e) Workstation/PC installation/deinstallation
- f) SW transfer installation/deinstallation
- g) COTS SW installation/deinstallation
- h) Security analysis & reporting
- i) Network administration, reporting & problem diagnosis
- j) System monitoring and status reporting

#### 6.1.5 Data Base Administration

- a) Product installation and disk storage management
- b) Server startup and shutdown
- c) User accounts and privileges
- d) Security and auditing
- e) Problem detection, tuning and performance monitoring

- f) Backup and recovery
- g) Planning & reporting

#### 6.1.6 Configuration Management Administration

- a) Recording, reporting status and managing configuration change requests (CCRs)
- b) Maintaining, archiving & retrieving CCR database
- c) Coordinating CCRs with external interfaces, requesting impact analysis
- d) Recording, reporting, managing & distributing changes to custom system SW
- e) Maintaining, archiving & retrieving SW Library
- f) Updating & maintaining access privileges to SW library
- g) Recording, reporting and maintaining system-level changes to the as-built baseline
- h) Generating configuration status accounting records, inventory of version control items
- i) Maintaining, archiving & retrieving controlled documentation

#### 6.1.7 Maintenance Coordination

- a) Reviewing assigned Trouble Tickets, identify source of maintenance support
- b) Conducting HW fault diagnosis, isolate failure, replace with spare
- c) Analysis of previous maintenance actions
- d) Determine/report present baseline configuration
- e) Coordinating & facilitating COTS HW & SW vendor problem resolution and upgrades
- f) Escalating irreconcilable COTS HW and SW problems
- g) Enter Trouble Ticket resolutions following COTS repair
- h) Enter details of maintenance action into inventory & logistics system
- i) Record emergency baseline configuration changes in DDTS
- j) Prepare CCRs resulting from maintenance actions

#### 6.1.8 ILS Administration

- a) Issuing COTS SW upgrades, spares & consumables
- b) Shipping failed HW to maintenance vendors
- c) Monitoring, recording & reporting vendor repair actions
- d) Recording receipt of COTS SW upgrades, spares and consumables
- e) Storing COTS SW upgrades, spares & consumables
- f) Notification & Reporting inventories, changes, lost/damaged property

#### 6.1.9 System Engineer (TBD)

#### 6.1.10 SW Maintenance Engineer

- a) Performing SW builds and compiles
- b) Making custom SW available for distribution
- c) Providing test cases, input & output test data
- d) Making changes to custom SW and database control files
- e) Providing traceability to previous configurations
- f) Providing changes to baseline documentation
- g) Recording SW maintenance problems
- h) Evaluating results of I&T
- i) Providing delivery notification
- j) Checking source code and scripts comply with EOS & DAAC coding standards
- k) Performing stand-alone testing
- l) Distributing science SW source files, documentation, test data
- m) Holding software reviews

#### 6.1.11 System Test Engineer

- a) Testing SW upgrades
- b) Analysing version upgrade test results
- c) Recording test problems
- d) Providing training exercise environments

### **IV. LDAAC Checklist for EOS AM1, LANDSAT 7, METEOR Missions**

#### **1 Science Software I&T at the LaRC DAAC**

This function takes each mission from algorithm delivery to a production readiness state.

##### 1.1 SSIT functions for CERES Mission

The following sections identify the operations functions necessary to support SSIT for the CERES instrument team. (The functions listed should map to positions and personnel assigned the lead role.)

##### 1.1.2 Science Data Specialist function

Identifies the CERES mission operations agreements and procedures followed by the Science Data Specialist (or position fulfilling the role as CERES Science Data Specialist). Lists the ongoing and startup coordination and system environment setup procedures, the procedures applied to the mission specific algorithm delivery packages, and whether the agreements are supported and procedures have been completed or successfully exercised for CERES at-launch SSI&T requirements.

##### 1.1.2.1 CERES Operations Agreements

##### 1.1.2.2 CERES Science Data Specialist environment setup

- a) SSIT Manager setup procedures
- b) SSIT Manager startup
- c) SSIT checklist setup

d) SSIT checklist update

1.1.2.3 CERES delivery package and production readiness

List and status of all delivery packages and procedures applied by the Science Data Specialist to perform SSI&T:

Subsystem 1 - Geolocate and Calibrate (3 PGEs)

Subsystem 2 - ERBE Spectral Correction (1 PGE)

Subsystem 3 - ERBE Monthly Processing (2 PGEs)

The following checklist is repeated for each DAP:

x.1) FTP acquisition of the Delivered Algorithm Packages (DAP)

x.2) DAP unpack and inspection

x.3) Science documentation review

x.4) FORTRAN 77 Check

x.5) FORTRAN 90 Check

x.6) C Check

x.7) Ada Check

x.8) Prohibited Function Check

x.9) Process Control File Check

x.10) Prologs Extraction

x.11) PCF Updates

x.12) Toolkit setup

x.13) Link with SCF Toolkit

x.14) Link with DAAC Toolkit

x.15) Link to Status Message Facility

x.16) SCF version execution environment setup

x.17) SCF version execution

x.18) PGE log files examination (SCF version)

x.19) File comparisons (SCF version)

- x.20) DAAC version setup
- x.21) DAAC version execution
- x.22) PGE log files examination (DAAC version)
- x.23) File comparisons (DAAC version)
- x.24) Product metadata views
- x.25) Product data views

### 1.1.3 Science SW CM Administration for CERES

List and status of all delivery packages and procedures applied by CM Administration supporting SSI&T:

- a) Subsystem 1 - Geolocate and Calibrate (3 PGEs)
- b) Subsystem 2 - ERBE Spectral Correction (1 PGE)
- c) Subsystem 3 - ERBE Monthly Processing (2 PGEs)

The following checklist is repeated for each DAP:

- x.1) Versioned Object Base created in ClearCase
- x.2) View created in ClearCase
- x.3) View set in ClearCase
- x.4) New Directory created in ClearCase
- x.5) Files imported into ClearCase
- x.6) File Checkout
- x.7) File Checkin

### 1.2.4 Earth Science Data Types for CERES

List and status of all delivery packages and procedures applied by SSI&T Support Engineers to complete ESDT registration and validation:

- Subsystem 1 - Geolocate and Calibrate (3 PGEs)
- Subsystem 2 - ERBE Spectral Correction (1 PGE)

### Subsystem 3 - ERBE Monthly Processing (2 PGEs)

The following checklist is repeated for each DAP:

- x.1) Metadata Configuration File compared to ESDT Granule Metadata
- x.2) New ESDT version created from MCF
- x.3) New ESDT creation
- x.4) ESDT registration
- x.5) ESDT validation

### 1.2.5 Production Planning

List and status of all delivery packages and procedures applied by production planning to complete SSI&T by updating PDPS databases:

### Subsystem 1 - Geolocate and Calibrate (3 PGEs)

### Subsystem 2 - ERBE Spectral Correction (1 PGE)

### Subsystem 3 - ERBE Monthly Processing (2 PGEs)

The following checklist is repeated for each DAP:

- x.1) ESDT metadata update
- x.2) PGE science metadata update
- x.3) SSIT operations metadata update
- x.4) Metadata creation in science data server (for static input files)
- x.5) Static data insert into science data server
- x.6) Target metadata creation for dynamic granule
- x.7) Test dynamic file insert into science data server
- x.8) PGE executable package insert into science data server
- x.9) Test data subscription registration
- x.10) New product request creation
- x.11) New production plan creation
- x.12) Production History log file review



x.13) PGE output metadata review

### 1.3 MISR Mission

#### 1.3.1 Science Coordination

#### 1.3.2 Science Data Specialist

#### MISR Operations Agreement

List and status of all delivery packages and procedures applied by the Science Data Specialist to perform SSI&T:

L1A MISP1A

L1A engr, MISP1AE

L1A motor current, MISP1AM

L1A cal, MISP1AC

L1B2 MISP1B2L

L2TC top of atmosphere/cloud, MISP2TC

L2AS aerosol/surface MISP2AS

### 1.4 MOPITT

#### 1.4.1 Science Coordination

#### 1.4.2 Science Data Specialist

#### MOPITT Operations Agreement

List and status of all delivery packages and procedures applied by the Science Data Specialist to perform SSI&T:

## **2. Ingest (Archive Manager)**

## **3. Production and Production Plans (Production Monitor)**

## **4. Product Archive and Distribution ( Archive Manager)**

## **5. Client & Interoperability & Data Management (User Services)**

## **6. Science System Management Services**

### **6.1 Operations Supervisor, Readiness and Performance Assurance**

- a) Scheduling Operations personnel
- b) Reporting mission operations performance
- c) Assessing & assigning Trouble Tickets
- d) Assessing and prioritizing CCRs
- e) Training and certification

### **6.2 Resource Manager**

- a) Reconfiguring HW
- b) Reconfiguring SW
- c) Reconfiguring LAN & DCE cells
- d) Maintaining processing and storage resource profiles
- e) Monitoring, analysis and reporting system utilization and performance
- f) Coordinating local network activities with external NOCs

### **6.3 Resource Planner**

- a) Coordinating proposed resource schedules
- b) Creating, editing, viewing and approving resource reservations
- c) Activating, publishing & distributing resource schedules
- d) Cancelling resource reservations

## 6.4 System Administration & Computer Operations

- a) System startup and shutdown
- b) System backups and restores
- c) System log maintenance
- d) User administration
- e) Workstation/PC installation/deinstallation
- f) SW transfer installation/deinstallation
- g) COTS SW installation/deinstallation
- h) Security analysis & reporting
- i) Network administration, reporting & problem diagnosis
- j) System monitoring and status reporting

## 6.5 Data Base Administration

- a) Product installation and disk storage management
- b) Server startup and shutdown
- c) User accounts and privileges
- d) Security and auditing
- e) Problem detection, tuning and performance monitoring
- f) Backup and recovery
- g) Planning & reporting

## 6.6 Configuration Management Administration

- a) Recording, reporting status and managing configuration change requests (CCRs)
- b) Maintaining, archiving & retrieving CCR database
- c) Coordinating CCRs with external interfaces, requesting impact analysis
- d) Recording, reporting, managing & distributing changes to custom system SW

- e) Maintaining, archiving & retrieving SW Library
- f) Updating & maintaining access privileges to SW library
- g) Recording, reporting and maintaining system-level changes to the as-built baseline
- h) Generating configuration status accounting records, inventory of version control items
- i) Maintaining, archiving & retrieving controlled documentation

#### 6.7 Maintenance Coordination

- a) Reviewing assigned Trouble Tickets, identify source of maintenance support
- b) Conducting HW fault diagnosis, isolate failure, replace with spare
- c) Analysis of previous maintenance actions
- d) Determine/report present baseline configuration
- e) Coordinating & facilitating COTS HW & SW vendor problem resolution and upgrades
- f) Escalating irreconcilable COTS HW and SW problems
- g) Enter Trouble Ticket resolutions following COTS repair
- h) Enter details of maintenance action into inventory & logistics system
- i) Record emergency baseline configuration changes in DDTS
- j) Prepare CCRs resulting from maintenance actions

#### 6.8 ILS Administration

- a) Issuing COTS SW upgrades, spares & consumables
- b) Shipping failed HW to maintenance vendors
- c) Monitoring, recording & reporting vendor repair actions
- d) Recording receipt of COTS SW upgrades, spares and consumables
- e) Storing COTS SW upgrades, spares & consumables
- f) Notification & Reporting inventories, changes, lost/damaged property

## 6.9 System Engineer (TBD)

## 6.10 SW Maintenance Engineer

- a) Performing SW builds and compiles
- b) Making custom SW available for distribution
- c) Providing test cases, input & output test data
- d) Making changes to custom SW and database control files
- e) Providing traceability to previous configurations
- f) Providing changes to baseline documentation
- g) Recording SW maintenance problems
- h) Evaluating results of I&T
- i) Providing delivery notification
- j) Checking source code and scripts comply with EOS & DAAC coding standards
- k) Performing stand-alone testing
- l) Distributing science SW source files, documentation, test data
- m) Holding software reviews

## 6.11 System Test Engineer

- a) Testing SW upgrades
- b) Analysing version upgrade test results
- c) Recording test problems
- d) Providing training exercise environments

## **V. NDAAC Checklist**

### **NSIDC DAAC System Science Operations Readiness Checklist**

EOS AM1, LANDSAT 7, METEOR Missions

## **2. Science Software I&T**

### **2.1 Science Software I&T at the GSFC DAAC**

#### **2.1.1 Science Coordination**

#### **2.1.2 Science Data Specialist**

a) acquiring the Delivered Algorithm Packages (DAP)

b) inspecting the DAP contents

c) reviewing science documentation

#### **2.1.2.1 MODIS Science Algorithms**

PGE01 L1 Level 1A and Geolocation

PGE02 L1B Calibrated radiances

PGE03 Cloud Mask and Atmospheric profiles

PGE06 L2 Cloud Properties

PGE04 L2 Atmosphere (land and ocean aerosols and precipitable water)

PGE05 L3 Interim Land Aerosol

PGE39 L3 Combined Atmosphere Product

PGE09 L2 Ocean Color

PGE17 L3 Ocean Color

PGE10 L2 Sea Surface Temperature

PGE19 L3 Sea Surface Temperature

PGE20 L3 Oceans Interim Daily

PGE49 L3 Oceans Interim Weekly  
PGE50 L3 Ocean Interim 3 week  
PGE51 L3 Ocean 3 Week Reference (mfill)  
PGE53 L3 Ocean Daily (mcloud)  
PGE54 L3 Ocean Weekly  
PGE11 L2 Reflectance  
PGE13 L2G Reflectance/Fire Tile  
PGE16 L2 Land Surface Temperature  
PGE12A L2G Pointers Tile  
PGE12B L2G Geo Angles Tile  
PGE07 L2 Snow  
PGE14 L2G Snow  
PGE08 L2 Sea Ice  
PGE15 L2G Sea Ice  
PGE18 Ocean Productivity Yearly

### 2.1.3 CM Administration

a) recording, reporting, managing and distributing science software

#### 2.1.3.1 MODIS CM Administration

### 2.1.4 Science Software I&T Support Engineering

a) performing standards checking

#### 2.1.4.1 MODIS standards

## 2.1.5 Production Planning

a) populating, maintaining the production planning database

### 2.1.5.1 MODIS production planning database



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## **Appendix C. Pre-Release B.0 Testbed Lessons Learned Experience**

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## **C.1 Testbed-related Recommendations**

The following recommendations were delivered to ECS Developers, ESDIS, ITs and the DAACs for review and consideration in implementing ECS Release 2.0. While the Testbed represents a limited experience, it gave us a head start on implementing ECS and avoiding some problems by process improvements.

## **C.2 Testbed Lessons Learned**

Incorporation of these Lessons Learned into Release 2.0 is an evolutionary process. The major accomplishments and Release 2.0 recommendations cover the areas documented in the following subsections:

### **C.2.1 Software**

#### **C.2.1.1 COTS (Commercial Off-The Shelf) Software**

For each COTS package, there should be consistent and well-known directory structures for COTS software on all workstations and servers.

- COTS software releases require detailed information (e.g., installation procedures, patch procedures).
- Updates to COTS HW/SW mapping baseline is required, with timely delivery to the field sites.
- Easily searchable COTS HW/SW mapping table is highly desired by the field sites.

A documented method of installation for architecturally-dependent auto mount/cross-mount or host-specific file system (local disk).

- COTS SW version descriptions must include patch levels.

COTS version differences between release baseline and Instrument Teams (ITs) identified sufficiently prior to RRR to allow for engineering analyses, impact assessments, and upgrade plans to be accomplished prior to RRR.

- ***Proposed/Accomplished Resolutions***

- *Developed a system VDD to be used by all DAACs to assist in the management and identification of all delivered software.*
- *Created a SEO Web page in order to make software release and other pertinent information readily available to the DAACs.*

*ESDIS is working on the IT version coordination issue.*

### **C.2.1.2 Custom Software**

For each release of software, consistent and well-known directory structures defined for custom software on all workstations and servers.

- Detailed information about the custom software needs to be provided with every software release.

A documented method of installation of architecturally-dependent auto mount/cross-mount or host-specific file system (local disk).

- Custom SW executables must be "versioned."

- ***Proposed/Accomplished Resolutions***

- *Developed a system VDD to be used by all DAACs to assist in the management and identification of all delivered software.*

*Created a SEO Web page in order to make software release and other pertinent information readily available to the DAACs.*

### **C.2.1.3 COTS Licenses**

- Documented number of licenses for each COTS package for a DAAC is according to a defined baseline.

Verification of the location, number, existence, and activation of proper licensing as part of the turnover to the Government for the system.

- During the procurement process, accountability of all (e.g., clearcase) licenses designated for the DAACs.
- Improved tracking/inventory of COTS software licenses at each DAAC.
- Process for obtaining/transferring licenses.

Installation-use-only passwords are required for all COTS products and should be placed in a central location where they can be accessed by the DAACs.

- ***Proposed/Accomplished Resolutions***

*M&O has centralized the tracking, inventory, maintaining and managing all COTS licenses.*

### **C.2.1.4 Tools and Products (COTS and Custom )**

- Documentation needed to support usage, maintenance, and troubleshooting of tools and products (e.g., 305, 609, etc.).
- README files and/or scripts to support installation of tools and products at field sites.

- Deviation from normal installation procedures provided along with appropriate documents.
- Special configuration changes along with appropriate documents.
- Integrated COTS products already configured for immediate M&O use (e.g., HP OpenView, Remedy, DDTs).
- ***Proposed/Accomplished Resolutions***
  - *M&O is actively participating in the integration & installation of 2.0 software into the Mini DAAC and the VATC.*
  - *M&O will be integrated into the development test team to support 2.0 testing activities.*
  - *M&O has initiated an investigation to implement Remedy across all DAACs.*

*M&O is coordinating with the development team as M&O update 611 and other M&O documents required to support 2.0.*

## **C.2.2 Configuration Management**

- Delivered system must be baselined.
- Downloadable freeware (e.g., Perl, CGI etc.) should be sourced and included as part of the field sites controlled baseline.
- Role-based account creation.
- Standardized S/W installation for consistent file group, owner, and access permissions.
- User account creation procedures (not site or configuration specific).
- Understanding the shift from developer-maintained to M&O-maintained production (e.g., TTs, CCRs, general change process, etc.).
- All ILS, property, and configuration management databases should be populated at turnover(e.g., ClearCase, XRP).
- Organizations buy-in to TT/CCR configuration management process.
- Training in the TT/CCR configuration management process.
- Improvement in the feedback loop from analyst/programmer to M&O CCB.
- ***Proposed/Accomplished Resolutions***
  - *Established TT and CCR process definitions.*
  - *Establishing configuration management process project instruction (PI).*
  - *Establishing process for distribution and maintenance of a system-level Version Description Document (VDD).*

- *Forwarding TTs and CCRs that are modifications, enhancement, etc. to ECS NCR Board for investigation and incorporation into 2.0 development.*
- *Established a standardized method for use of “.cshrc” template by the DAACs.*
- *Integrated SEO personnel with CM 2.0 build team in order gain knowledge of the 2.0 CM install build process.*
- *Working to populate XRP Baseline Manager database with 2.0 information.*
- *Obtaining configuration management process approval from all DAACs.*

### **C.2.3 Hardware**

- Disk Capacity
  - Adequate disk space to support the science software (e.g., Clearcase).
  - Space calculation for science software support prior to delivery of the software to the DAACs.
    - Working area to capture and explode the DAPs before insertion into Clearcase.
    - A typical PGE + data may take up to 50GB of permanent or temporary disk space for delivery or during runtime.
- ***Proposed/Accomplished Resolutions***
  - *Established communication with Science Data Advisory Panel.*
  - *Scheduled to participate in the Science Data Advisory Panel meeting in October.*
- Available Disk
  - Purchase of a spare disk to support field sites’ operation in case of failure.
- ***Proposed/Accomplished Resolutions***
  - *ECS is re-evaluating the disk space requirements at each DAAC.*

### **C.2.4 Operability**

- Technical Support
  - Ongoing continuous maintenance and technical support following deployment.
  - Knowledgeable technical support staff to assist field sites in trouble shooting field problems.
- Technical Support staff :
  - responsive to the field sites.
  - follow-through problems to resolution.

- System-wide mailing list to notify all sites of issues having global impacts (e.g., Products: DNS, DCE Organizations: NSI, EBnet).
- Field Sites staff actively involved in the version 2.0 integration and test process.
- Technical support contact list for each of the delivered subsystems available during the delivery of the system to the field sites.
- Instructions on how to set-up and configure all COTS products (e.g., Sybase, Autosys).
- ***Proposed/Accomplished Resolutions***
  - *M&O and SDE continued TT/CCR review telecons and maintenance support since Testbed deployment.*
  - *M&O is participating in the integration and installation of version 2.0 software builds into the Mini DAAC and VATC environment.*
  - *M&O has become an integral part of the DCE and Security Working Group teams.*
  - *M&O GDAAC personnel to participate in version 2.0 integration and test activities.*
  - *Established testbed technical support contact list .*
  - *Created a SEO Web page for global distribution of information.*
- Scripts:
  - Documented scripts for installation, startup, population of databases etc.
  - Baseline operation scripts (at DAAC or at system level).
- *M&O GDAAC personnel to participate in database architect design meetings and analysis process.*
- *M&O is participating in the integration and installation of version 2.0 software in the Mini-DAAC and the VATC.*
- Operational Environment
  - Integrated approach to role-based user environment setup for all supported shells.
- ***Proposed/Accomplished Resolutions***
  - *SMO is investigating the number of different shells being used by the various subsystems.*
  - *Established a standardized method for use of “.cshrc” template by the DAACs.*
- Transition
  - Participation of M&O personnel in the test program is critical to successful transition.

### ***Proposed/Accomplished Resolutions***

- *M&O personnel are members of the integration and installation of version 2.0 software into the Mini-DAAC and the VATC.*
- *M&O will participate in version 2.0 integration and test.*

## **C.2.5 SSI&T**

- Products
  - SSI&T process: run the same jobs over and over on the same data.
- ***Proposed/Accomplished Resolutions***
  - *Testbed trouble ticket telecon resolved problem to DAAC's satisfaction and forwarded trouble ticket to version 2.0.*
- SSIT Test Environment
  - Fast turnaround on OS, compiler, and production upgrades to support required upgrades.
  - Feedback loop with ESDIS/ECS/ITs/DAACs on baseline restrictions and necessary updates.
- ***Proposed/Accomplished Resolutions***
  - *Conceived and implemented Testbed COTS "engineering versions" to be tested at a DAAC site.*
  - *ESDIS is working on IT version coordination issue..*

## **C.2.6 Upgrades**

- Define scope of each upgrade, including extent of impact to the DAACs.
- Generate "Release Letters".
- Approach to cover both COTS and Custom upgrades.
- Allow for inclusion of DAAC specific patches.
- Define responsibility for system and regression testing of upgrades.
- ***Proposed/Accomplished Resolutions***
  - *Established Weekly TT telecons.*
  - *Developed a system VDD which identifies the release of the COTS and Custom software.*
  - *DAACs implemented site CCB's with forwarding of system impacts to system DDTs.*
  - *Established SEO test team for the Testbed.*



*Established COTS “engineering versions” to be tested by the DAAC.*

### **C.2.7 Training**

- Define scope of each upgrade, including extent of impact to the DAACs.
- Generate “Release Letters”.
- Approach to cover both COTS and Custom upgrades.
- Allow for inclusion of DAAC specific patches.
- Define responsibility for system and regression testing of upgrades.
- ***Proposed/Accomplished Resolutions***
  - *Established Weekly TT telecons.*
  - *Developed a system VDD which identifies the release of the COTS and Custom software.*
  - *DAACs implemented site CCB’s with forwarding of system impacts to system DDTS.*
  - *Established SEO test team for the Testbed.*
  - *Established COTS “engineering versions” to be tested by the DAAC.*

### **C.2.8 Network**

- Mail Server
  - Two versions of DDTS on the same mail server domain caused problems.
  - Secure web server (mail server).
- ***Proposed/Accomplished Resolutions***
  - *Have one instance of DDTS running on the mail server domain.*
- DCE
  - Involvement of SEO and DAAC personnel in ECS DCE activities prior to delivery of the system to the field sites.
- ***Proposed/Accomplished Resolutions***
  - *SEO is an integral part of ECS DCE IPT team.*
  - *SEO is performing DCE products upgrades and installation in the Mini DAAC and VATC.*
- Network
  - Establish a formal process for notification of changes to the network.

- *Proposed/Accomplished Resolutions*
- *Initiated the formation of a Network Working Group among DAACs.*

### **C.2.9 Documentation**

- Version Description Document (VDD) built before system is installed.
- Full directory structure for the delivered system in the VDD.
- System implementation plan consistent with the physical and functional configuration at the field sites.
- Timely update to documentation.
- ***Proposed/Accomplished Resolutions***
- *Established a process for distribution and maintenance of Version Description Document (VDD) .*

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# Abbreviations and Acronyms

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ADS	Archive Data Set
AT	Acceptance Test
ATO	Acceptance Test Organization
CCB	Change Control Board
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CI	Configuration Item
CM	configuration management
CMO	Configuration Management Office
COTR	Contracting Officer's Technical Representative
COTS	Commercial off the shelf
CSR	Consent to Ship Review
CSU	Computer Software Unit
DAAC	Distributed Active Archive Center
DID	Data Item Description
DMO	Data Management Office
DMP	DAAC Data Migration Plans
DSS	Data Server Subsystem
EBnet	EOSDIS Backbone Network
ECS	EOSDIS Core System
EDF	ECS Development Facility
EDOS	EOS Data and Operations System
EOC	EOS Operations Center
EOSDIS	Earth Observing System Data and Information System
EP	Evaluation Package
ESDIS	Earth Science Data and Information System (GSFC Code 505)
ETR	Element Test Review

F&PRS	Functional and Performance Requirement and Specification
FCA	Functional Configuration Audit
FOS	Flight Operations Segment
GFE	Government Furnished Equipment
GN	Ground Network
GSFC	Goddard Space Flight Center
I&C	Installation and Checkout
I&T	Integration and Test
ICD	Interface Control Document
ILS	Integrated Logistics Support
ILSO	Integrated Logistics Support Office
IPT	Integrated Product Teams
IST	Instrument Support Toolkit
IV&V	Independent Verification and Validation
LMC	Local Maintenance Coordinator
LPS	Landsat Processing System
LRU	Line Replacement Unit
LSM	Local System Management
M&O	Maintenance and Operations
MDT	Mean Downtime
MODIS	Moderate-Resolution Imaging Spectroradiometer
Nascom	NASA Communications
NCR	Non-conformance Report
OEM	Original Equipment Manufacturers
OPSTEL	Operations Teleconference
OR	Operational Readiness
ORE	Operational Readiness Exercise
ORR	Operational Readiness Review
PCA	Physical Configuration Audit

PDS	Planetary Data System
PPM	Principal period of maintenance
QA	Quality Office
RRR	Release Readiness Review
SMC	System Monitoring And Coordination Center
TRMM	Tropical Rainfall Measuring Mission (joint US-Japan)
TRR	Test Readiness Review
VDD	Version Description Document

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